# Accelerated Pavement Test Study

*Type of Research:*

- Full scale field trafficking study
- Pavement Optimization

*Research Organization*

- U.S. Army Corps of Engineers, Engineer Research and Development Center (ERDC), Vicksburg, Mississippi

*Geosynthetic Product Tested:*

- Tensar TriAx® TX5 Geogrid

*Field Testing*

- A full scale trafficking trial was conducted by USCOE incorporating the Tensar TriAx TX5 Geogrid. The test results are presented in the USCOE's final report ERDC/GSL TR-14-28 "Performance of Geogrid-Stabilized Flexible Pavements" written by Gregory J. Norwood and Jeb S. Tingle.

*Pavement Test Sections*

Two different flexible pavement sections of equal design life were tested. A control section with non-stabilized base, plus a thinner section with a stabilized base. The sections were as follows

Item 1 (control): 4.75 in. of HMA and an unstabilized, 8-in. crushed limestone base course on CBR 6.0% subgrade.

Item 2 (stabilized): 3.50 in. of HMA and a 6.5 in. crushed limestone base course stabilized with geogrid on California Bearing Ratio (CBR) 6.0% subgrade.

Comparative pavement designs were established using AASHTO 1993 for the unstabilized design and Tensar's SpectraPave4-PRO™ software for the stabilized TriAx TX5 Geogrid design. The intent of the design was to validate equal performance between the two test sections.

*Pavement Materials*

- Subgrade Soil Type: High Plasticity Clay - CH (USCS), A-7-6 (AASHTO)
- Subgrade Strength: CBR = 6%
- Asphalt Concrete: Highway mix for Mississippi (Superpave PG 67-22)
- Aggregate Base Course: A crushed limestone with up to 7% fines content meeting Type A Grade 2 flexible base according to the TxDOT standard.

*Pavement Loading and Testing*

- A Heavy Vehicle Simulator (HVS) was used to simulate normal highway loadings. The configuration used for testing consisted of a tandem-axle dual wheel gear loaded to apply 2.08 equivalent single axle loads (ESALs) per pass.
- Test sections were fully instrumented (subgrade, base course, and HMA) to monitor and characterize pavement response during traffic testing.
- Pavement thicknesses were determined from trenches excavated after trafficking.

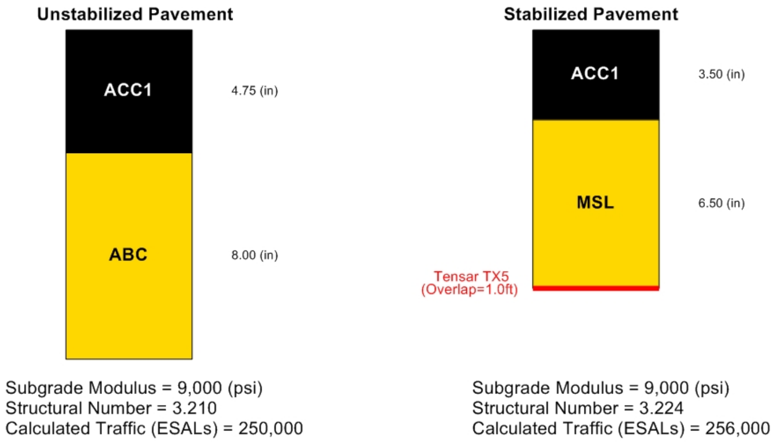
*Results:*

- The USCOE researchers concluded that equal performance was observed between both test items at all traffic levels. The most important component for this determination was the comparison of permanent surface deformation data. Table 1 demonstrates that both test sections exhibited the same level of permanent surface deformation over the course of trafficking – indicating equal performance.

| Test Item | Pavement Structure | Permanent Surface Deformation (in.) | | | | |
|---|---|---|---|---|---|---|
| | | 832 ESAL | 5,200 ESAL | 52,000 ESAL | 104,000 ESAL | 200,000 ESAL |
| Item 1 | Control | 0.00 | 0.05 | 0.09 | 0.17 | 0.25 |
| Item 2 | Stabilized | 0.00 | 0.00 | 0.13 | 0.21 | 0.28 |

**Table 1. Permanent surface deformation measurements.**

- Figure 1 demonstrate a good correlation in performance between the full scale research and the predicted performance determined from Tensar SpectraPave4PRO software.



Subgrade Modulus = 9,000 (psi)
Structural Number = 3.210
Calculated Traffic (ESALs) = 250,000

Subgrade Modulus = 9,000 (psi)
Structural Number = 3.224
Calculated Traffic (ESALs) = 256,000

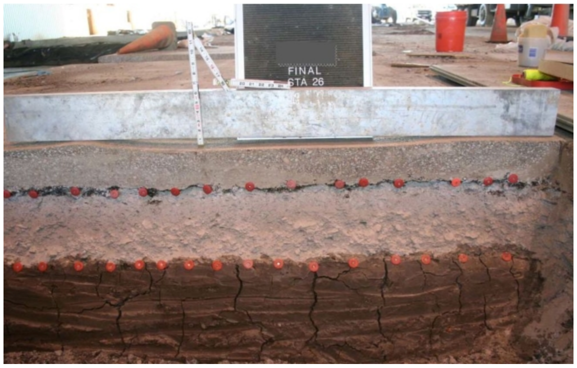
**Figure 1. Screenshot from SP4PRO showing the good correlation to USCOE full scale research**

*Key Findings:*

- The geogrid-stabilized pavement section performed equally as well as the thicker unstabilized pavement section, validating the comparative performance prediction from Tensar's SpectraPave4-PRO design software and the assumed design layer coefficient of 0.267 for the stabilized TriAx TX5 Geogrid layer.

- Post-test forensics showed little or no evidence of shearing in the subgrade or the base course of either Item 1 or Item 2.

Item 1 (Control) excavated trench



Item 2 (Stabilized) excavated trench