



In Situ Cyclic Loading of Concrete Pavement Overlays Supported on Geotextile and Asphalt Interlayers

David J. White, Ph.D., P.E., President and CEO, Ingios Geotechnics, Inc
 Peter Taylor, Ph.D., P.E., Director, National Concrete Pavement Technology
 National Concrete Consortium, Spring 2021 WEBINAR



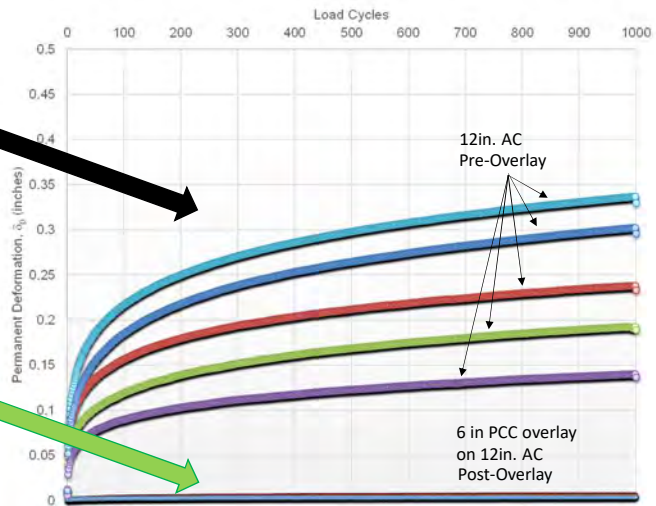
Existing AC Pavement (Pre-Overlay)



PCC Pavement (Post-Overlay)



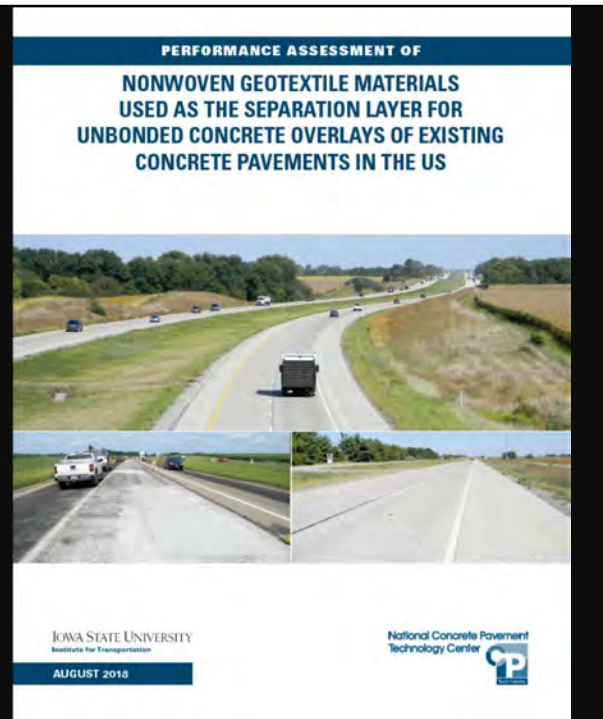
D16 Buchanan County, Iowa P.C.C. overlay 2020



Geotextiles have been in use as separation layer for over a decade in the US. Some questions yet remain:

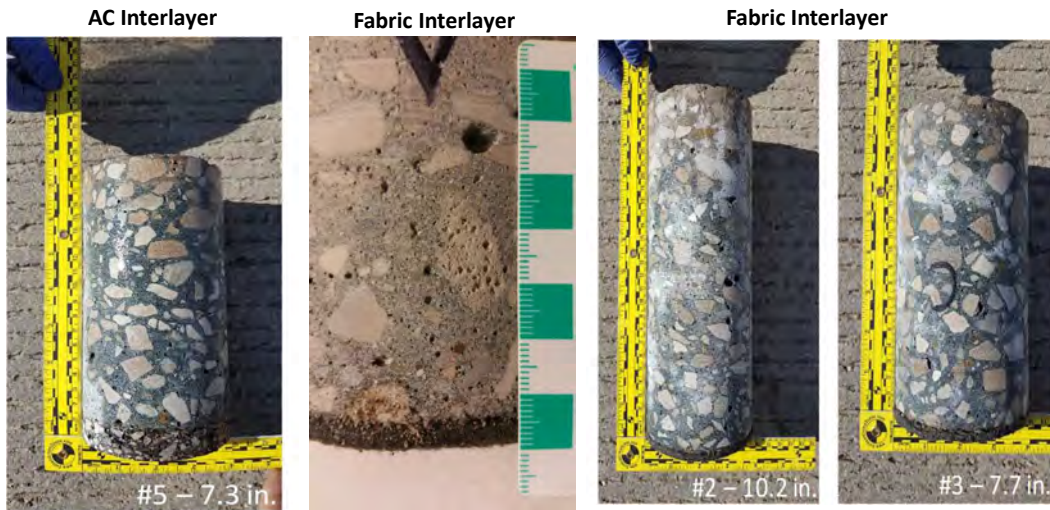
- How does the geotextile influence **vertical deflections** in the system?
- Does this tendency **change over time**?
- Does the thickness of the textile matter?
- Is the risk of slab migration changed?
- Are there any other impacts of reduced friction between layers?
- Are the layers effective at providing drainage and does it change over time?
- Does the risk of cracking change?
- Does the color of the textile affect thermal performance of the slab?

Automated Plate Load Testing (APLT) was used for In situ assessment of the performance of different interlayer sections in Iowa.

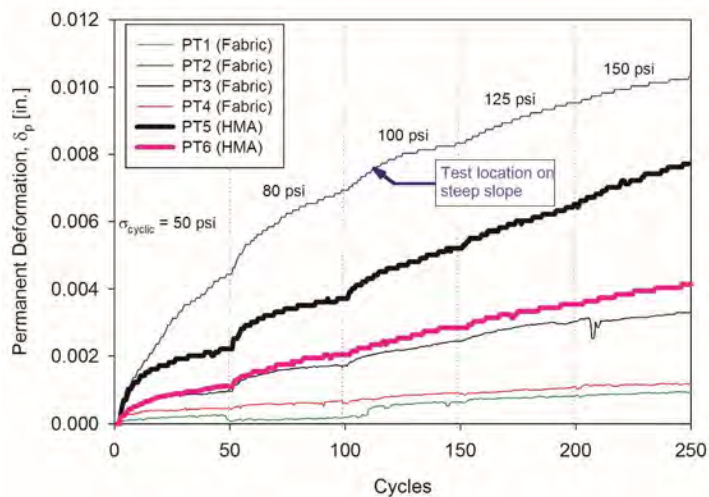


V18, Poweshiek County, Iowa
(Sections built in 2008/2009, Tested in October 2016)

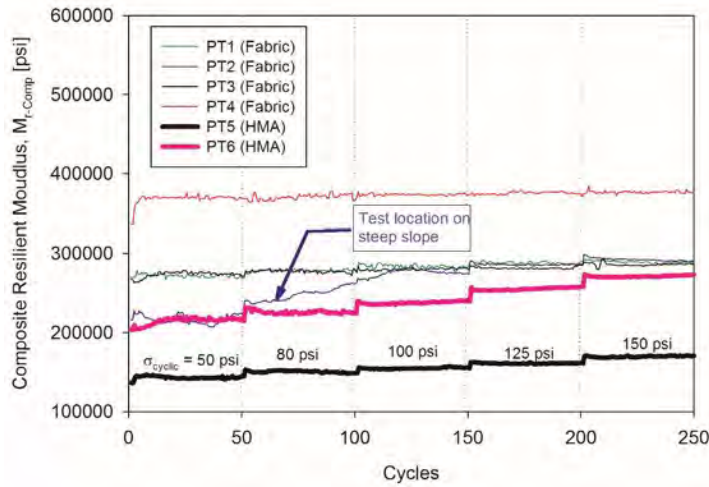
V18, Poweshiek County Test Sections



Permanent deformation values were lower in geotextile fabric sections than in AC interlayer sections

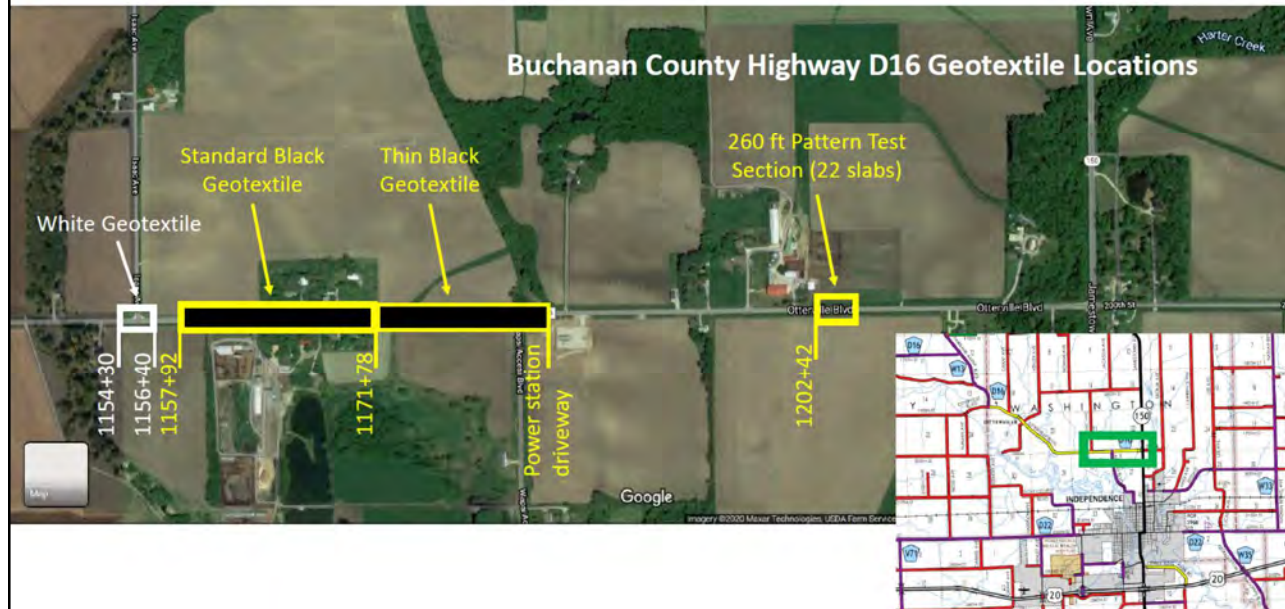


Resilient Modulus values were higher in the geotextile fabric sections than in AC interlayer sections



ingios

Summer 2020 Test Sections



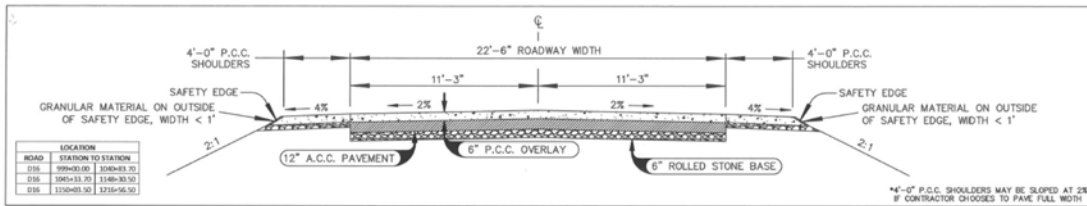
Variables

Fabric Thickness (5-7 Oz versus 13-15 Oz):

- Standard Black Geotextile - Tencate MPBBC1450
- Thin Black Geotextile - TenCate Mirafi 160N/12.5/360

Color of Geotextile (White vs. Black):

- White Geotextile – Reflectex® by Propex
- Standard Black Geotextile - Tencate MPBBC1450



Buchanan County, Iowa



Existing Conditions: 12 in. AC Layer





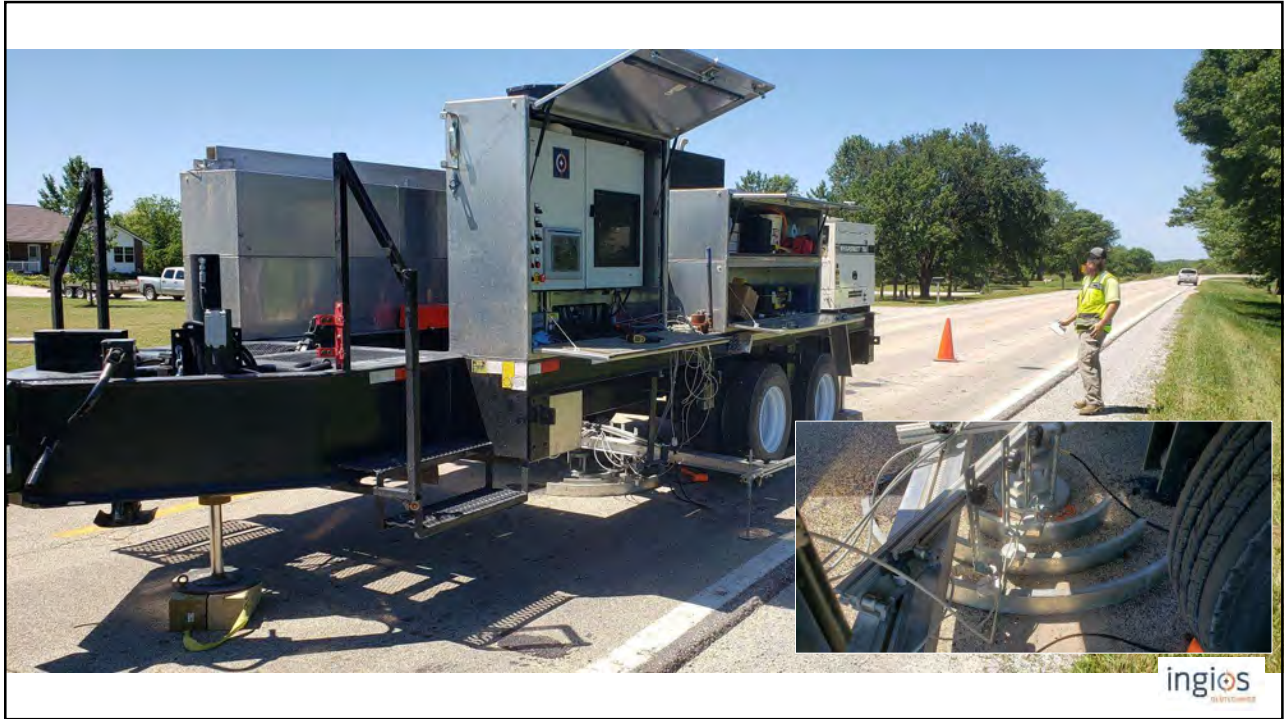
Existing Conditions:
12 in. AC Layer

Picture Courtesy of Dan King, P.E.
Iowa Concrete Paving Association



Existing Conditions:
12 in. AC Layer





7/22/2020



Thin Black Geotextile –
TenCate Mirafi 160N/12.5/360

Picture Courtesy of Dan King, P.E.
Iowa Concrete Paving Association



White Geotextile –
Reflector™ by Propex

Picture Courtesy of Dan King, P.E.
Iowa Concrete Paving Association



CONTROL SECTION



Picture Courtesy of Dan King, P.E.
Iowa Concrete Paving Association

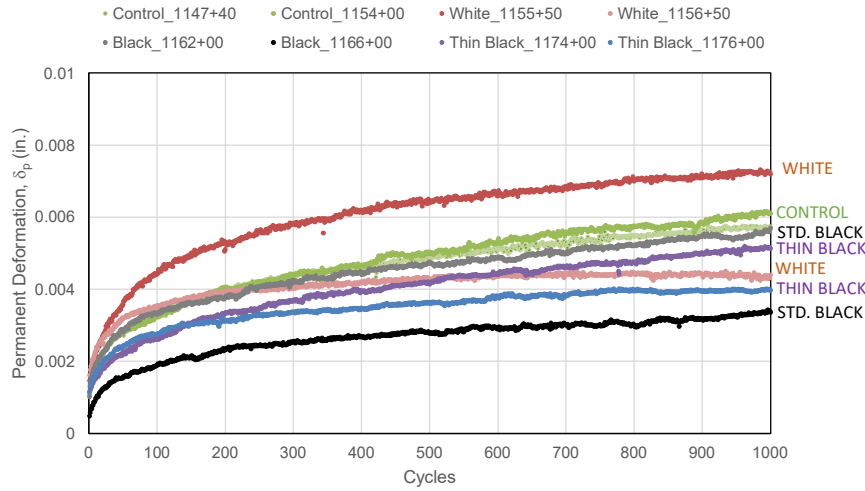


Picture Courtesy of Dan King, P.E.
Iowa Concrete Paving Association

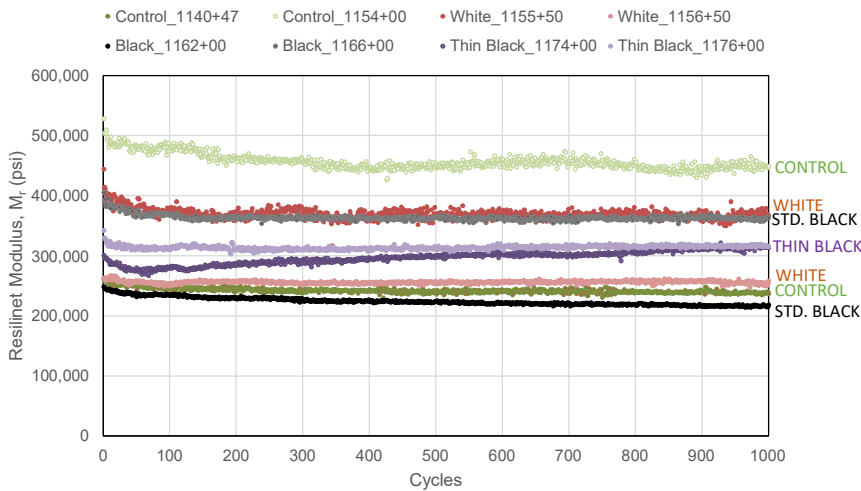




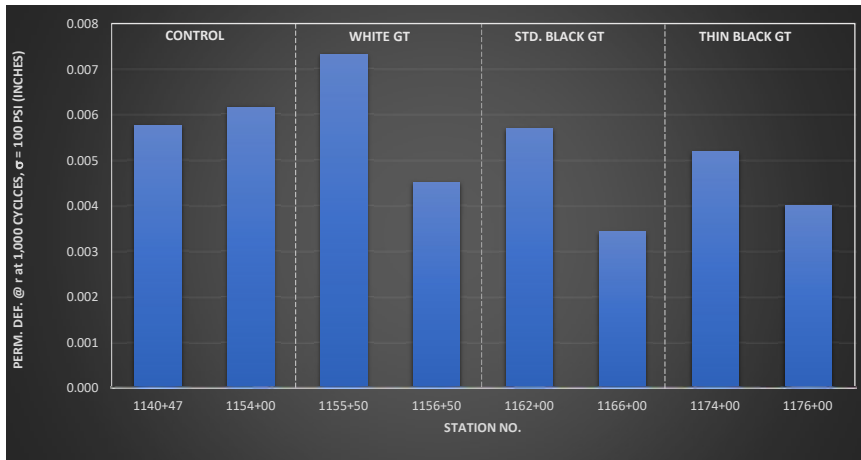
Permanent deformation values under cyclic loading.



Permanent deformation values under cyclic loading.



Permanent deformation values at end of 1,000 cycles in each section.



Composite Mr values in different sections pre- and post-overlay

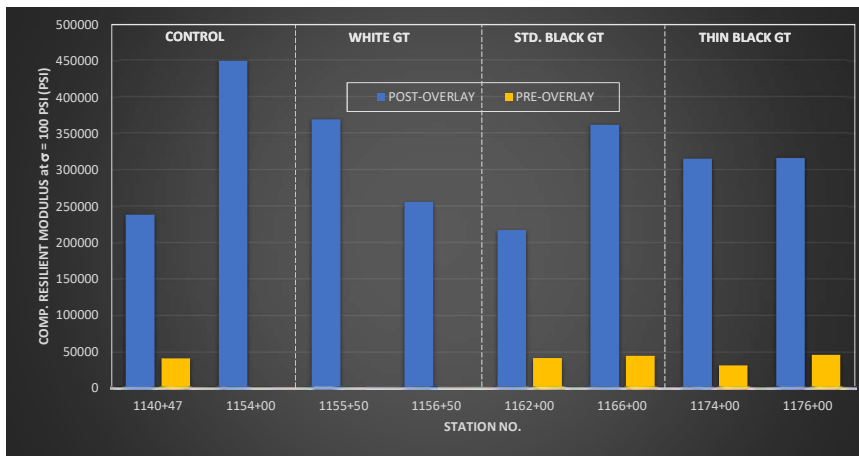
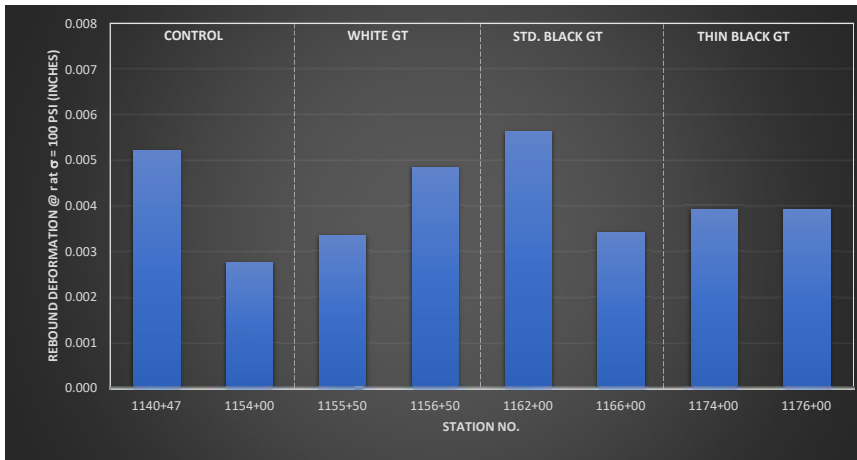
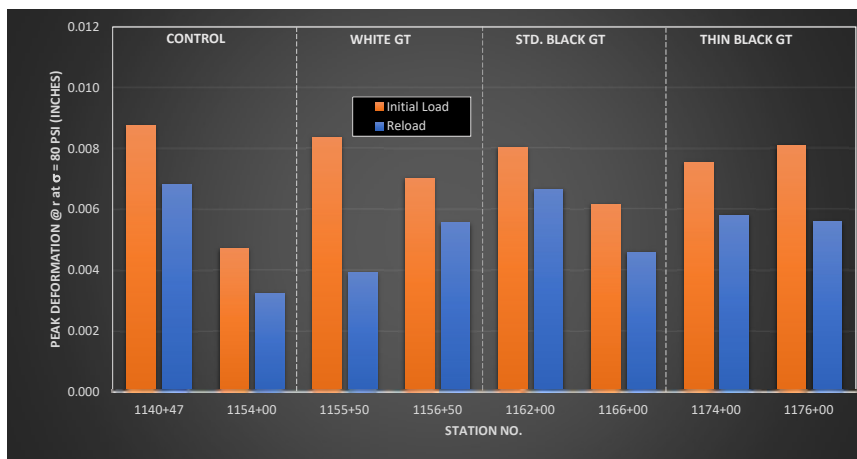


Plate rebound values in different sections under cyclic load of 100 psi at 1,000 cycles



ingios
SOLUTIONS

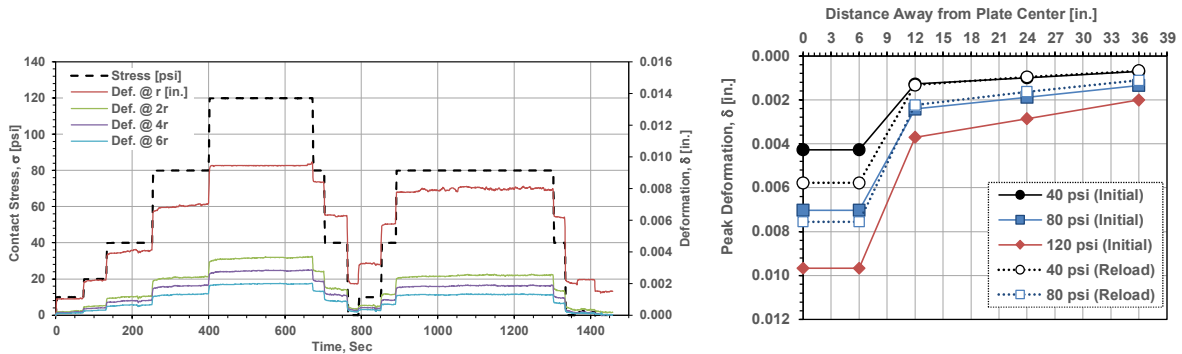
Peak deformation under a static load of 80 psi in each section.



ingios
SOLUTIONS

*Influence of support conditions?
Differences in load-deformation hysteresis?
APLT performance testing planned for fall 2021.*

*Analysis underway using pavement deflection basin analysis
and interlayer k-value calculations*



THANK YOU!

David J. White, Ph.D., P.E., President and CEO, Ingios Geotechnics, Inc
Peter Taylor, Ph.D., P.E., Director, National Concrete Pavement Technology
National Concrete Consortium, Spring 2021 WEBINAR

