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
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.

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
Existing Conditions:
12 in. AC Layer

7/10/2020
White Geotextile – Reflectex® by Propex
Standard Black Geotextile - Tencate MPBBC1450

7/22/2020
Picture Courtesy of Dan King, P.E.
Iowa Concrete Paving Association

7/22/2020
Standard Black Geotextile
Tencate MPBBC1450

White Geotextile – Reflectex® by Propex

Picture Courtesy of Dan King, P.E.
Iowa Concrete Paving Association
Thin Black Geotextile – InoCote Mirafi 160N/12.5/360

White Geotextile – Reflectex® by Propex

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APLT TESTING PLAN

- 12 in. diameter loading plate
- CYCLIC PLT @ 100 psi cyclic stress for 1,000 cycles
- INCREMENTAL LOADING STATIC PLT up to 120 psi (load/reload cycles)
- STATIC AND CYCLIC DEFORMATION BASIN
- FOLLOW-UP TESTING 1 YEAR AFTER CONSTRUCTION
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

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

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