Geosynthetics Testing at NAPTF

Construction Cycle 9

Presented to: REDAC
By: Ryan Rutter
Date: September 8, 2021
AN ACT: To reauthorize programs of the Federal Aviation Administration, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled

Title V - Miscellaneous

SEC. 558. GEOSYNTHETIC MATERIALS.

The Administrator of the Federal Aviation Administration, to the extent practicable, shall encourage the use of durable, resilient, and sustainable materials and practices, including the use of geosynthetic materials and other innovative technologies, in carrying out the activities of the Federal Aviation Administration.
Program Overview

✓ Literature Review
✓ Establish Draft Specification for Use of Geosynthetics
✓ Incorporate into AC 150/5370-10H Update
  • Obtain/Analyze Data through Full-Scale Testing
  • Modify Specifications based on Full-Scale Testing
  • Include Geosynthetics into FAARFIELD
Definition

• Geosynthetics
  – Synthetic polymeric materials that are specifically manufactured to be used in geotechnical and geoenvironmental applications

• Types
  – Geotextiles, Geogrids, Geomembranes, Geonets, Geocomposites, Geocells, Geosynthetic clay liners, Erosion control products, Many others (Geofibers, Geofoam, Geopipes, Paving interlayers)
Geosynthetic Functions

• Separation
• Reinforcement
• Stiffening
• Filtration
• Barrier
• Drainage
• Protection
NAPTF Construction Cycle 9 (CC9)
# Pavement Structures

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>St. 1+20 – 1+65 North</strong></td>
<td><strong>St. 1+20 – 1+65 South</strong></td>
<td><strong>St. 1+80 – 2+25 South</strong></td>
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<tr>
<td>5.1 inch P-401</td>
<td>5.2 inch P-401</td>
<td>5.2 inch P-401</td>
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<tr>
<td>7.7 inch P-209</td>
<td>7.7 inch P-209</td>
<td>7.8 inch P-209</td>
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<tr>
<td>Geogrid, Class B</td>
<td>29.1 inch P-154</td>
<td>29.1 inch P-154</td>
</tr>
<tr>
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<td>Separator Fabric, Class 2</td>
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<tr>
<td>Clay Subgrade (CBR=5)</td>
<td>Clay Subgrade (CBR=5)</td>
<td>Clay Subgrade (CBR=5)</td>
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Trafficking

- Started on April 5, 2021
- 129 wanders applied (8,514 passes) as of Sept. 7
Rutting using Straightedge

- No cracking
- Only rutting

- No cracking
- Only rutting
Leica 3D Scanner

- April 9, 2021 (330 passes)
- May 14, 2021 (3,234 passes)

Trafficicking Start: April 5
Heavy Weight Deflectometer

- Normalized Deflections at 0-inch Offset
Heavy Weight Deflectometer

- Normalized Deflections at 72-inch Offset

![Graph showing normalized deflections at 72-inch offset with dates from 3/5/2021 to 7/3/2021. The graph compares normalized deflections at 35 kips for Geogrid & Fabric, Fabric Only, and Control conditions. The Trafficking date is marked with a dashed line.]
Trafficicking & HWD Testing

Federal Aviation Administration

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Heavy Weight Deflectometer

- Normalized Deflections at 0-inch Offset

![Graph showing normalized center deflections at 35 kips (mils) from 3/5/2021 to 7/3/2021. The graph compares trafficked and untrafficked areas, with lines for Geogrid & Fabric, Fabric Only, and Control. Untrafficked areas are highlighted at 5-ft from CL.](image-url)
Heavy Weight Deflectometer

- Normalized Deflections at 72-inch Offset

![Graph showing normalized deflections at 72-inch offset for different dates and treatments: Geogrid & Fabric, Fabric Only, Control, with untrafficked areas highlighted.](image)
Summary

• Initial trafficking shows higher rutting for test items with geosynthetics
  – Trafficking is still at early stages
  – Conclusions can’t be drawn from initial results

• Variation in rutting performance could be due to slight variations in subgrade

• Trafficking can be repeated in untrafficked areas (5-ft from CL), where deflections are similar
Thank you