Stump The Instructor

Sustainable, Cost-Effective Roadways

Presenter: Kim Jordan
Tensar Region Manager
Four Improvements:

- Build new inventory to last longer and fail less expensively
- Extend life of existing inventory
- Stretch maintenance cycles
- Walk on water! “Tensar Bubba Video”

Cost savings, life extension, or both
Overview

- Pavement Optimization
  - AASHTO 93
- Subgrade Stabilization
  - Giroud-Han
- Pavement Overlays
  - GlasGrids
“Rods wear out from the top down, but they fall apart from the bottom up.”

National Association of County Engineers
Do You Have Roads Like This?
Tensar Can Help!
Colrain DPW - Base Stabilization

What is the benefit?

<table>
<thead>
<tr>
<th>CBR 0.5%</th>
<th>Colrain Trial Runs</th>
<th>Subgrade Stabilization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Design</td>
<td>Cost</td>
</tr>
<tr>
<td>Geosynthetic</td>
<td>NX750</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Unstabilized</th>
<th>Stabilized</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unstabilized</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 in.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5% CBR</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stabilized</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 in. 0.5% CBR</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Initial Construction Costs</th>
<th>Unstabilized</th>
<th>Stabilized</th>
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</thead>
<tbody>
<tr>
<td>Aggregate</td>
<td>$18,716</td>
<td>$8,773</td>
</tr>
<tr>
<td>Geosynthetics</td>
<td>$3,004</td>
<td></td>
</tr>
<tr>
<td>Excavation</td>
<td>$2,568</td>
<td>$1,204</td>
</tr>
<tr>
<td>Total cost</td>
<td>$21,284</td>
<td>$12,981</td>
</tr>
<tr>
<td>Unit cost</td>
<td>$36.84/ft³</td>
<td>$22.47/ft³</td>
</tr>
<tr>
<td>Savings</td>
<td>$8,302 (39%)</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Additional Considerations</th>
<th>Unstabilized</th>
<th>Stabilized</th>
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<tbody>
<tr>
<td>Construction time</td>
<td>4 days</td>
<td>2 days</td>
</tr>
<tr>
<td>Dump truck trips</td>
<td>112</td>
<td>54</td>
</tr>
<tr>
<td>Fuel required</td>
<td>597 gal</td>
<td>288 gal</td>
</tr>
<tr>
<td>Water required</td>
<td>12,842 gal</td>
<td>6,020 gal</td>
</tr>
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</table>
Pavement Optimization - What Is The Benefit?

Estimated Unit Prices:
- Excavation - $5 / CY
- HMA Wearing - $80/t
- HMA Leveling - $70/t
- ABC Aggr. - $18/t
- TX5 geogrid - $3.5/SY

Unstabilized
- 1.5" ACC
- 2.5" ACC
- 10" ABC
- Subgrade
- 117,000 ESALs
- SN = 3.080
- $28.12 / SY

PERFORMANCE Stabilized 1
- 1.5" ACC
- 2.5" ACC
- 10" MSA
- TX5
- Subgrade
- 686,000 ESALs
- SN = 3.990
- $31.89 / SY

COST NEUTRAL Stabilized 2
- 1.5" ACC
- 2" ACC
- 9" MSA
- TX5
- Subgrade
- 349,000 ESALs
- SN = 3.446
- $27.64 / SY

COST SAVINGS Stabilized 3
- 1" ACC
- 2" ACC
- 7" MSA
- TX5
- Subgrade
- 120,000 ESALs
- SN = 3.088
- $24.44 / SY
Why Tensar Geogrids Work

1) Aggregate Confinement
2) Improved Bearing Capacity
3) Tension Membrane Effect

Google: Tensar Bubba Video

MAKE STONE PERFORM BETTER

These mechanisms were identified and defined by ACE USACOE, Tngle & Webster (2003)
Installation - Simple
Sustainable, Cost Effective Roadway Maintenance
Cracks
Ride / Aesthetics / Fuel Economy / Vehicle Damage ...
Solution is GlasGrid

GlasGrid® is to asphalt what rebar is to concrete

• Stronger than steel
• No separation between courses
GlasGrid
How Does GlasGrid Work?

- Creates a composite material combining:
  - compressive strength of the asphalt
  - tensile strength of the glass fibers
- Cracks propagating upwards are intercepted and redirected horizontally
Van Hut Road
GlasGrid® placed on shoulder.

Van Hut Road
4 years after install.
GlasGrid 8501 Installed 2003 S/B curb lane only – 3” HMA and 13 yrs later

← Crack stops at the GlasGrid →
Fiberglass Paving Grid
Installation Requirements

• Leveling course is required - \( \frac{3}{4} \)” thickness
• Surface clean and dry
• Compact GlasGrid using pneumatic tire roller
• A tack coat is suggested, TF best
• 1.5” Overlay
GlasGrid Tack Film - GG8511TF
Project - City of Ithaca
Fiberglass Paving Grid
High Strength Asphalt Pavement Reinforcement

- Project - 25 yrs
- GG8501 extends reflective crack relief of an overlay by up to 300%.

Project: Centralia Airport, ON
Project Date: June 1993
Image taken: August 2018
Project Profile
NH DOT I-93 Concord - Canterbury

Project date: May 2006

Right lane
- Mill out 3.5” (89mm) of failed mix
- ½” (12.5mm) levelling
- Place 100 x 200 kN Fiberglass Paving Grid 10 feet wide in lane (GG8502/8512)
- Pave 2 lifts of 1.5” (37.5mm)

Left lane
- Mill out 2.5” (63.5mm of mix)
- Replace in two lifts 25.5mm + 37.5mm

Future schedule:
- 40mm lift of ACC to meet design analysis, schedule for the following year, however this was postponed until 2016. Ten year delay.
Project Profile
NH DOT I-93 Concord - Canterbury 2006
Project Profile
NH DOT I-93 Concord - Canterbury 2006 VS 2012
Tensar Will Help!

✓ Extend life of existing inventory - GlasGrid

✓ Stretch maintenance cycles – InterAx, TriAx, GlasGrid

✓ Build new inventory to last longer and fail less expensively – InterAx & TriAx
Questions?