GlasGrid® Asphalt Pavement Reinforcement

October 21, 2016



Introduction to Cracks

- Crack sources are numerous and varied
- Cracks are consistent pavements aren't
- Solutions for cracks have had mixed results





Pavement Distress

AC overlays deteriorate rapidly from:

Load Associated Reflected Cracks (\$) – Impulse Load

- PCC Pavement Joint Reflective Cracks,
- Fatigue/Alligator Cracks,
- Block Cracks, and
- Asphalt Construction Joint Cracks
- Displacement Associated Reflected Cracks (⇔) -

Continuous

- Thermal Cracks,
- Lane Widening Differential Settlement Cracks, and
- Shrinkage Cracks,



Transverse Cracking - Thermal Associated





Longitudinal Cracking - Thermal and Load Associated





Block Cracking - Load







TECHNICAL FABRICS

Solution



GlasGrid® Solution:

Increase the Tensile and Shear Characteristics of Asphaltic Concrete to overcome Crack Associated Stresses



ACC Pavement Reinforcement Required Qualities



- High Tensile with Low Elongation
- Glass has the necessary modulus advantage to reinforce Asphalt.
- Elastomeric polymer coating protects the glass as well as promotes ACC bonding to the ribs.
- Pressure sensitive adhesive ensures efficient installation.
- ACC reinforced by GlasGrid® is millable, RAP is reusable.

Reinforcing Material Types

 High Stiffness vs. Low Stiffness
The stiffness modulus of the GlasGrid® is at least 10x that of the asphalt





- 8501 / 8511-
- Complete Road System TS : 100 kN/m x 100 kN/m
- Designed for Overlays Over : Fatigued Layers, Reflected Shrinkage Cracks, Block Cracks
- Uses Tensile Strength in two directions (Bi Directional)





The Products for our Solution



- 8502 / 8512-
- **Detail Repair System** TS: 200 kN/m x 100 kN/m **Designed for Overlays Over : Reflected Joint Cracks**, **Thermal Cracks**, or **Construction Joints, eg. Lane** Widening Joint Cracks Favors Tensile Strength in one direction, but still bidirectional

GlasGrid® 8502 Placement – Major Interstate









Design Thickness

Overlay must be 11/2" min compacted_____

Level course must be ³/₄" min compacted





GlasGrid® Installation Requirements

Critical Factors

- AC Wearing Course / Overlay Thickness \geq 1.5"
- Leveling Course (i.e. Thermal Applications)
- Clean, Dry Surface AND Cured (Emulsion) Tack
- Seal Cracks >¹/₄" Using Appropriate Sealant
- **Factors Influencing Performance**
- Achieving Optimum AC Density
- Use Appropriate PG Binder Grade (Thermal)



Product in Place





Surface Conditions

Tack Coats

If local procedures or specifications require a tack coat to be used, it may be applied prior or after the installation of GlasGrid®

Sufficient time must be allowed for the tack to <u>DRY & CURE</u>



Applications

Applications : Roadways





Applications : Airports





Applications : Airport Aprons





TECHNICAL FABRICS

Applications : Inter Urban Routes





TECHNICAL FABRICS







Performance

GlasGrid® over PCC Pavements LA DOTD – LA 1

- PCC slabs with good load transfer efficiency were rehabilitated with 3" of ACC.
- GlasGrid® 8502 placed over PCC joints
 - only in travel section, no GlasGrid® in turn lanes
- After a little over one year
 - cracks in turning lanes appeared,
 - while travel section remains in good shape several years later.

This is what we want!





Long-Term Performance

GlasGrid® installed in 1997 in the driving lane of a major interstate highway. **Passing lane** is cracked where no reinforcement was used.





Long-term Performance



GlasGrid® installed in Nov. 2003. Un-reinforced cracked pavement is only 5 months older than reinforced section.





Long Term Performance





June 1994 3" ACC with GlasGrid®



July 2005



July 2004

- 400,000 yds² of GlasGrid® 8511 placed
- Night work due to high daily traffic demand
- GlasGrid® can be placed at 25,000 yd² /day
- Contractor's progress was dependent on Asphalt plant capacity not by GlasGrid® laying efficiency.



Research

Laboratory Testing

- Texas A & M (Fatigue, Thermal Cracking) Dr. Robert Lytton - College Station, Texas, USA
- Delft University (Thermal Cracking Only) Dr Arian De Bondt, Ooms, Delft.
- Nottingham University, (Fatigue, Rutting, Reflective and Thermal Cracking) Saunders, Thom, Brown, Nottingham, UK
- NCAT National Center for Asphalt Technology, (full scale accelerated loading test track, Rutting) Ray Brown, Auburn, AL, USA

Texas A&M Laboratory Testing

Flexural Test Results showed the following:

Crack propagates to bottom of reinforcement and then is redirected horizontally



Mode II - Crack propagates to bottom of reinforcement and then is redirected horizontally.



Laboratory Testing

Existing pavement must be structurally sound

- "If there is poor load transfer across the crack, no reinforcement will help" as stated by Dr. Lytton at Texas A&M University
- Normal remedial work must be completed as for any standard overlay

ECHNICAL FABRICS

Seal all cracks wider than 1/4"



SAINT-GOBAIN

Laboratory Testing

Texas A&M (Dr. Robert Lytton) studies conclude that:

GlasGrid® will extend the life of the overlay 2 to 3 times that of an unreinforced overlay

A 3" overlay reinforced with GlasGrid®, performs equivalent to 5-8" of unreinforced asphalt with regard to reflective cracking

NCAT Accelerated Loading Test Track Alburn, AL – installed June 2000 - Today

- Heavy duty structural design built for the loading requirements that it was intended.
 - Approx 24" of ACC over a significant granular base.
- Section W1, first section of the curve. NW Corner
 - 4" of SMA PG 76-28 binder
 - GlasGrid® 8501 in second half of the 200 ft length.
 - 20 million ESAL's loading since installation.
 - 100 ft longitudinal crack in the non GlasGrid® section.

SAINT-GOBAIN

• GlasGrid® section is without any visible cracking.









BENEFITS

- Increased service life of overlay
- Reduction in pavement maintenance frequency
- Reduction in pavement maintenance costs

- Minimize pavement closures to carry out maintenance
- GLASGRID® ADDS VALUE TO YOUR PROJECT

QUESTIONS ?



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GLASGRID® PRESENTATION