
FIBERMAT
The Ultimate Stress Absorbing Membrane
presented by
SLOAN
CONSTRUCTION
COLAS
Solutions

INTRODUCTION

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Solutions

FiberMat®

THE PROBLEM

- Pavements deteriorate from the day they are put to use.
- We can enhance the function by designing quality pavement layers.
- However reflective cracking is still prevalent.
- We know that geo-textile treatments reduce reflective cracking.

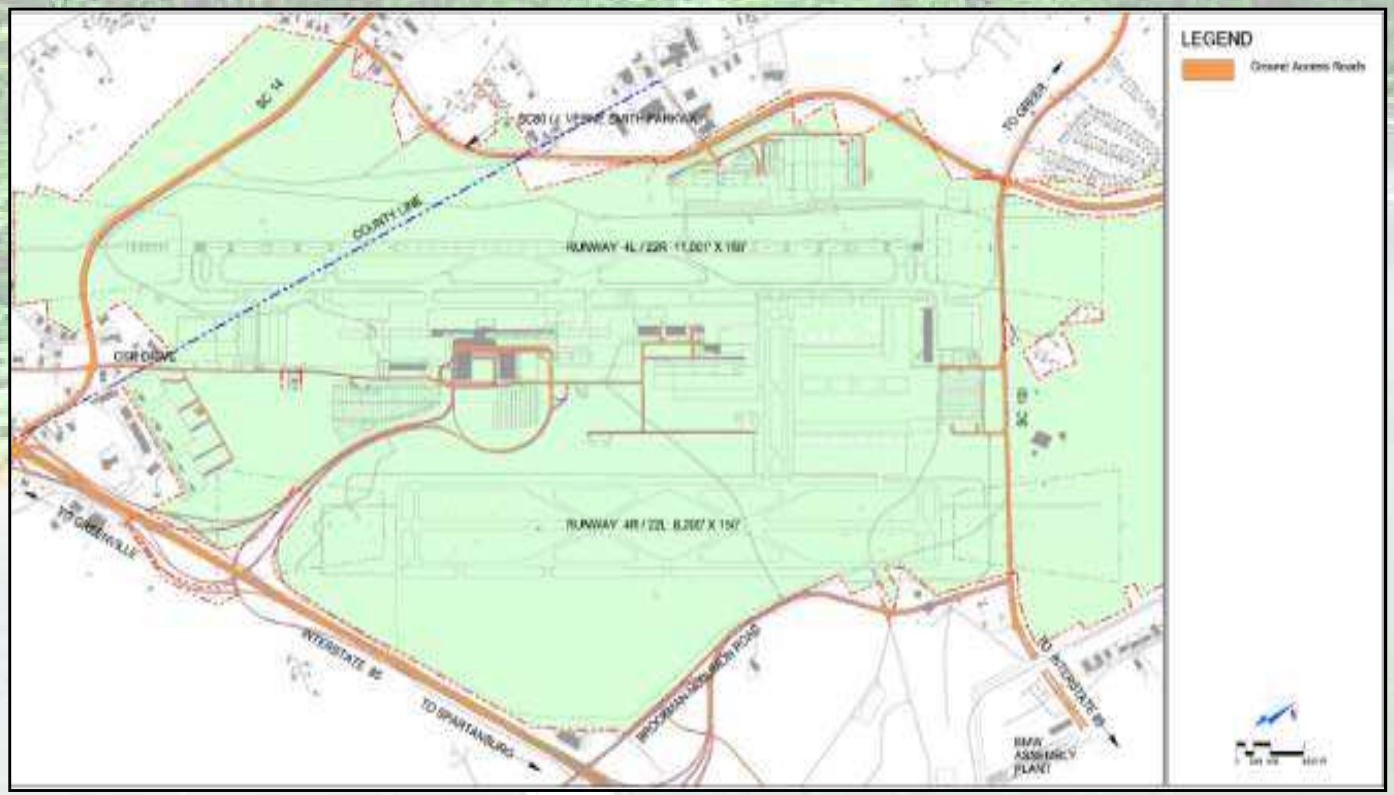
ADDING TO THE PROBLEM

Today's Airport Professionals have an enormous responsibility

An average of 1.5 million people fly in the United States each day

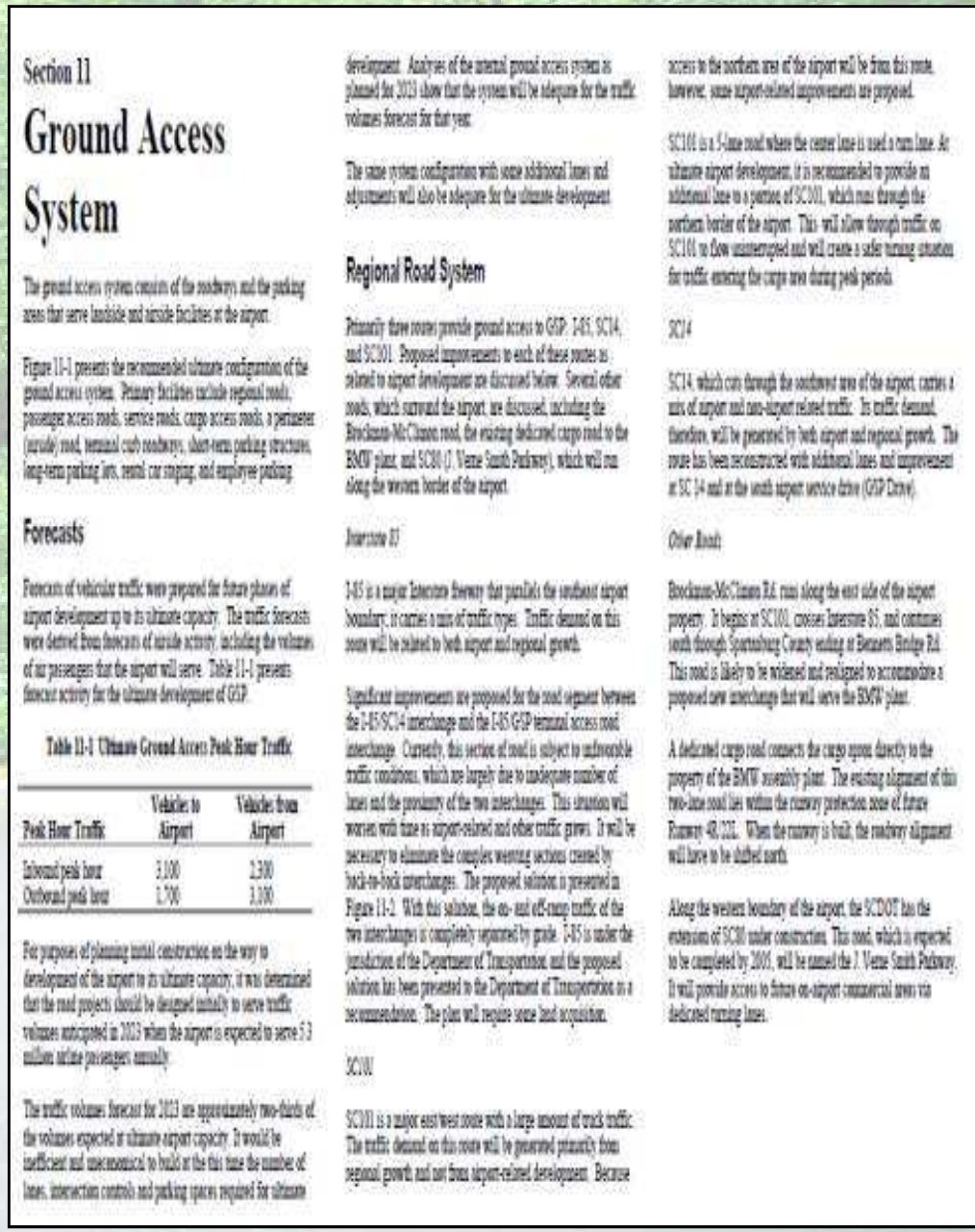
Greenville/Spartanburg serviced over 1.25 million passengers in 2009

Planning for a passenger level of 5.3 million passengers by the year 2023



THE SOLUTION

- Greenville/Spartanburg International Airport continued improvements
- Looking for innovative and cost saving Ideas
- Continued growth in its future



Section 11

Ground Access System

The ground access system consists of the roadways and the parking areas that serve landside and airside facilities at the airport.

Figure 11-1 presents the recommended ultimate configuration of the ground access system. Primary facilities include regional roads, passenger access roads, service roads, cargo access roads, a perimeter (airside) road, terminal curb roadways, short-term parking structure, long-term parking lots, rental car staging, and employee parking.

Forecasts

Forecasts of vehicular traffic were prepared for future phases of airport development up to its ultimate capacity. The traffic forecasts were derived from forecasts of airside activity, including the volumes of air passengers that the airport will serve. Table 11-1 presents forecast activity for the ultimate development of GSP.

Table 11-1 Ultimate Ground Access Peak Hour Traffic

Peak Hour Traffic	Vehicles to Airport	Vehicles from Airport
Inbound peak hour	3,100	2,300
Outbound peak hour	2,700	3,100

For purposes of planning initial construction on the way to development of the airport to its ultimate capacity, it was determined that the road projects should be designed initially to serve traffic volumes anticipated in 2013 when the airport is expected to serve 5.3 million airline passengers annually.

The traffic volumes forecast for 2013 are approximately two-thirds of the volumes expected at ultimate airport capacity. It would be inefficient and uneconomical to build at this time the number of lanes, intersection controls and parking spaces required for ultimate development. Analyses of the internal ground access system as planned for 2013 show that the system will be adequate for the traffic volumes forecast for that year.

The same system configurations with some additional lanes and adjustments will also be adequate for the ultimate development.

Regional Road System

Primarily three routes provide ground access to GSP: I-85, SC14, and SC101. Proposed improvements to each of these routes as related to airport development are discussed below. Several other roads, which surround the airport, are discussed, including the Brockman-McClimon road, the existing dedicated cargo road to the BMW plant, and SC101 (J. Verne Smith Parkway), which will run along the western border of the airport.

Interstate 85

I-85 is a major Interstate freeway that parallels the southeast airport boundary; it carries a mix of traffic types. Traffic demand on this route will be related to both airport and regional growth.

Significant improvements are proposed for the road segment between the I-85/SC14 interchange and the I-85/GSP terminal access road interchange. Currently, this section of road is subject to unfavorable traffic conditions, which are largely due to inadequate number of lanes and the proximity of the two interchanges. This situation will worsen with time as airport-related and other traffic grows. It will be necessary to eliminate the complex weaving sections created by back-to-back interchanges. The proposed solution is presented in Figure 11-2. With this solution, the on- and off-ramp traffic of the two interchanges is completely separated by grade. I-85 is under the jurisdiction of the Department of Transportation, and the proposed solution has been presented to the Department of Transportation as a recommendation. The plan will require some land acquisition.

SC101

SC101 is a major east/west route with a large amount of truck traffic. The traffic demand on this route will be generated primarily from regional growth and not from airport-related development. Because access to the northern area of the airport will be from this route, however, some airport-related improvements are proposed.

SC101 is a 5-lane road where the center lane is used a turn lane. At ultimate airport development, it is recommended to provide an additional lane to a portion of SC101, which runs through the northern border of the airport. This will allow through traffic on SC101 to flow uninterrupted and will create a safer turning situation for traffic entering the cargo area during peak periods.

SC14

SC14, which cuts through the southwest area of the airport, carries a mix of airport and non-airport related traffic. Its traffic demand, therefore, will be generated by both airport and regional growth. The route has been reconstructed with additional lanes and improvement at SC 14 and at the south airport service drive (GSP Drive).

Other Roads

Brockman-McClimon Rd. runs along the east side of the airport property. It begins at SC101, crosses Interstate 85, and continues south through Spartanburg County ending at Benaters Bridge Rd. This road is likely to be widened and realigned to accommodate a proposed new interchange that will serve the BMW plant.

A dedicated cargo road connects the cargo apron directly to the property of the BMW assembly plant. The existing alignment of this two-lane road lies within the runway protection zone of future Runway 4R-22L. When the runway is built, the roadway alignment will have to be shifted north.

Along the western boundary of the airport, the SCDOT has the extension of SC101 under construction. This road, which is expected to be completed by 2005, will be named the J. Verne Smith Parkway. It will provide access to future on-airport commercial areas via dedicated turning lanes.

ASSET MANAGEMENT

- Limited Preservation
- Underestimated Traffic, Loads, Costs
- Use Locally Available Materials
- Repaired Worst First
- Design for Lowest Initial Cost
- Limited Design Life
- Limited Economic Analysis
- Insufficient Funds

New and innovative thinking is required to stretch the limited dollars available

Asset Management The New Approach

- Transportation Networks Viewed as Utilities
- Investments in Assets Rather than the Traditional Public Idea of Mere Expenditures of Funds

Airport and DOT professionals are making Business decisions when it comes to Investing Public Funds

PAVEMENT CONDITION INDEX, PCI

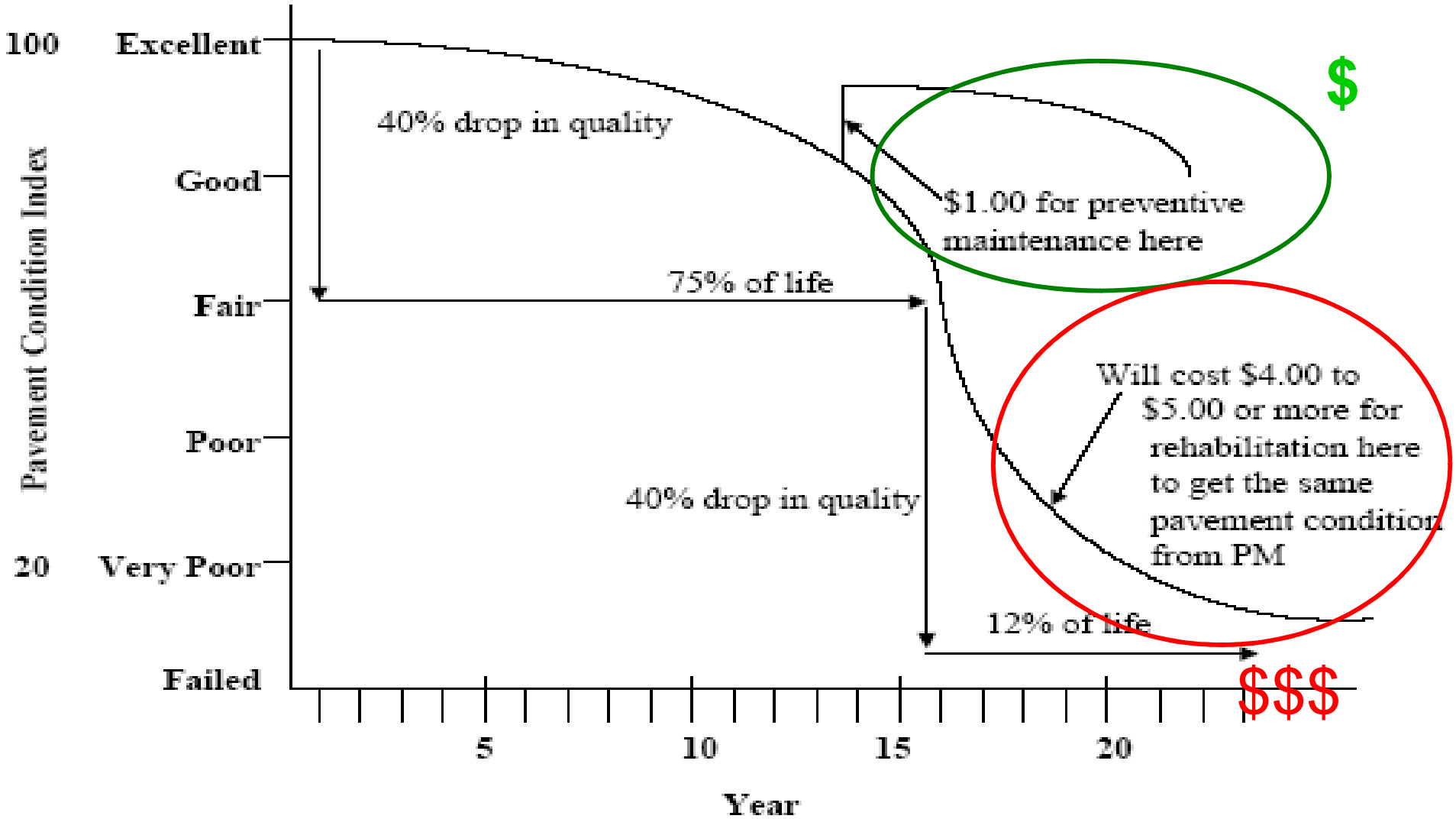


Figure 1.2. Typical Variation in Pavement Conditions as a Function of Time (modified after reference 4)

SELECTING A PREVENTIVE MAINTENANCE TREATMENT FOR FLEXIBLE PAVEMENTS, Dr. R. Gary Hicks, P.E.,Stephen B. Seeds, P.E., David G. Peshkin, P.E., prepared for Foundation for Pavement Preservation

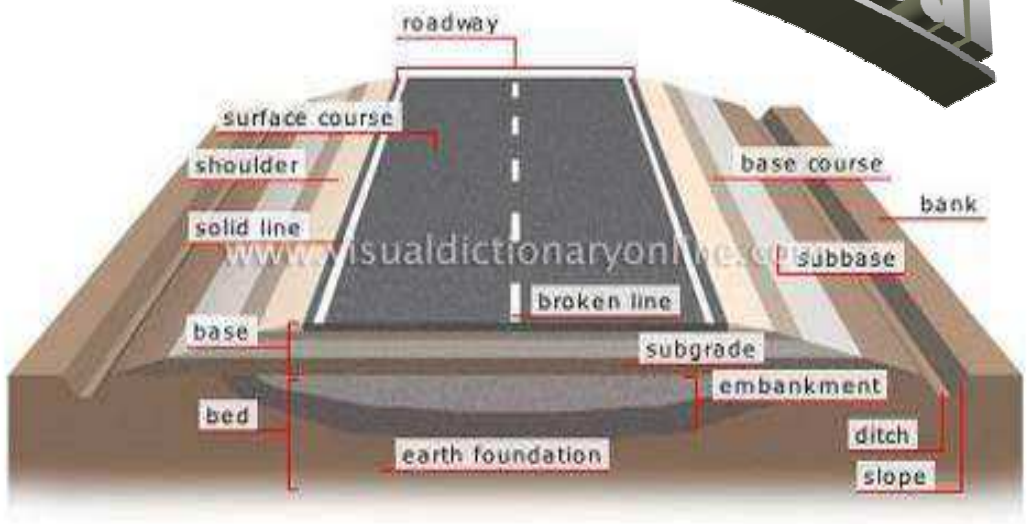
BUT WHAT'S THE FIX?

- Road Condition
  - Base is structurally sound
  - Road has good edge drainage
  - Road surface is starting to crack and allow water intrusion into the sub base.

Fog Seal

Slurry Seal

Chip Seal



WHAT PROCESS TO USE ?

Treatment	Pavement Condition										Parameters														
				Rutting		Cracking					Climate				Traffic Volumes										
						Alligator B																			
	Raveling	Oxidation	Bleeding	<1/2"	>1/2"	0 to 10%	10 to 20 %	20 to 30 %	Longitudinal	Transverse	Desert	Valley	Coastal	Mountains	ADT<5000	ADT 5000-3000	ADT<3000	Night/Cold	Stop Points	Urban	Rural	High Snow Plow Use	Cost Per Lane Mile	Life Expectancy (years)	Life Cycle Cost ($/year)
Crack/Joint Seal																									
Emulsion	N	N	N	N	N	F	P	N	F	F	G	G	G	G	G	G	G	N	G	G	G			2	1,700
Modified (Rubber)	N	N	N	N		G	G	G	G	G	G	G	G	G	G	G	G		G						1,000
Low Modulus (Polymer & Asphalt)	N	N	N	N	N	G	F	N	G	G	G	G	G	G	G	G	G								
Fog Seal (See note 1)	F	G	N	N	N	F	P	N	P	P	G	G	G	G	F	N									4,500
Rejuvenator (See note 1)	G	G	N	N	N	F	N	N	N	N	G	G	G	G	G	F									1,500
Slurry Seals																									
Type II (See note 2)	F	G	N	N	N	F	N	N	N	N	G	G						F							3,700
Type III	G	G	N	F	N	F	P	N	N	N	G	G						N						to 4	3,700
Micro-surfacing																									
Type II (See note 2)	F	G	N	G	N	F	N	N						G									16,000	4	4,500
Type III	G	G	N	G	G	F	P							G							G			3 to 4	4,500
Chip Seal																									
PME – Med. Fine	G	G	N				F				G						N	N	P	P		P	6,500	3 to 5	1,600
PME – Medium	G	G	N				F				G						N	N	P	P	G	F	6,500	3 to 5	1,600
PM[illegible] Medium							F								G	G		G	P	P	G	F	12,500	4 to 5	2,800
P[illegible]							P							G	G		N	G	P	P	G	G	12,500	4 to 5	2,800
AR[illegible]											G	G		G	G		N	G	P	P	G	F	20,000	4 to 6	4,000
AR[illegible]							P	P	P		G	G	G	G	N		N	G	P	P	G	G	20,000	4 to 6	4,000
PM Alte[illegible]																									
Conv[illegible]				P	P	N		F	N	P	P	G	G	G	G	G	G	G	P	G	G	G	O	19,500	3 to 4	5,600
PBA [illegible]	G	G		F	N	G	F	N	P	P	G	G	G	G	G	G	G	F	G	G	G	P	25,000	4 to 5	5,600
AR/C[illegible]	G	G	P	F	N	G	G	F	P	P	G	G	G	G	G	G	G	P	G	G	G	P	28,000	4 to 6	5,600
Thin Blanket ACOL																									
Conventional	G	G	P	G	G	G	G	F	P	P	G	G	G	G	G	G	G	G	G	G	G	G	20,000	3 to 5	5,000
PBA	G	G	P	G	G	G	G	G	F	F	G	G	G	G	G	G	G	G	G	G	G	G	25,000	3 to 6	5,600
R (Type G)	G	G	P	G	F	G	G	G	G	G	G	G	G	G	G	G	G	F	G	G	G	G	30,000	5 to 8	4,600
	P	P	G	N	G	N	N	G	P	P	G	G	G	G	G	G	G	G	G	G	G	G	19,000	5 to 8	2,900

G – Good Performance
F – Fair Performance
P – Poor Performance
N – Not Recommended

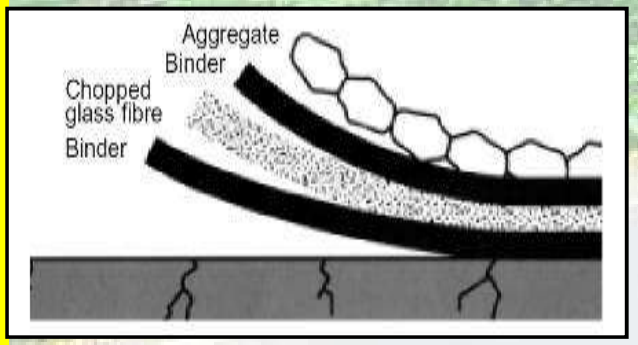
Note: 1. Generally used on shoulders, low volume roads, and parking areas. Should not be placed on traveled way by contract until further notice.
2. Generally used on shoulders, parking areas, and locations where a less aggressive surface texture is desired.

The right treatment at the right time on the right road

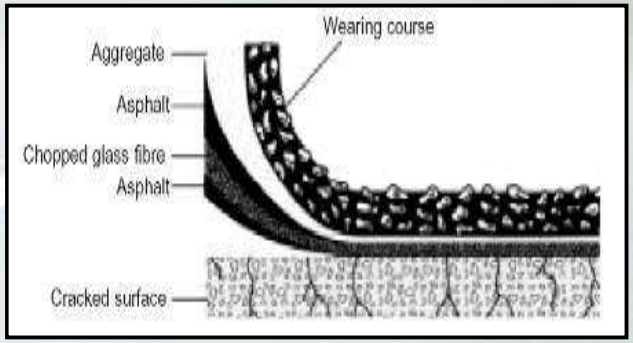
REFLECTIVE CRACKS

- Fog seals, Slurry Seals and Chip Seals water proof the road as long as the emulsion membrane is not compromised.
- Reflective cracks quickly propagate through the surface treatment defeating the purpose

FIBERMAT®



Type A
Wearing Surface



Type B
Interlayer

FIBERMAT® PROCESS

HISTORY

- Developed in the UK
- Used as a SAMI and Wearing Course
- Used in traditional chip seal, decorative finishes, bridge decks, textile and grid markets

FIBERMAT® PROCESS

FiberMat® was designed to:

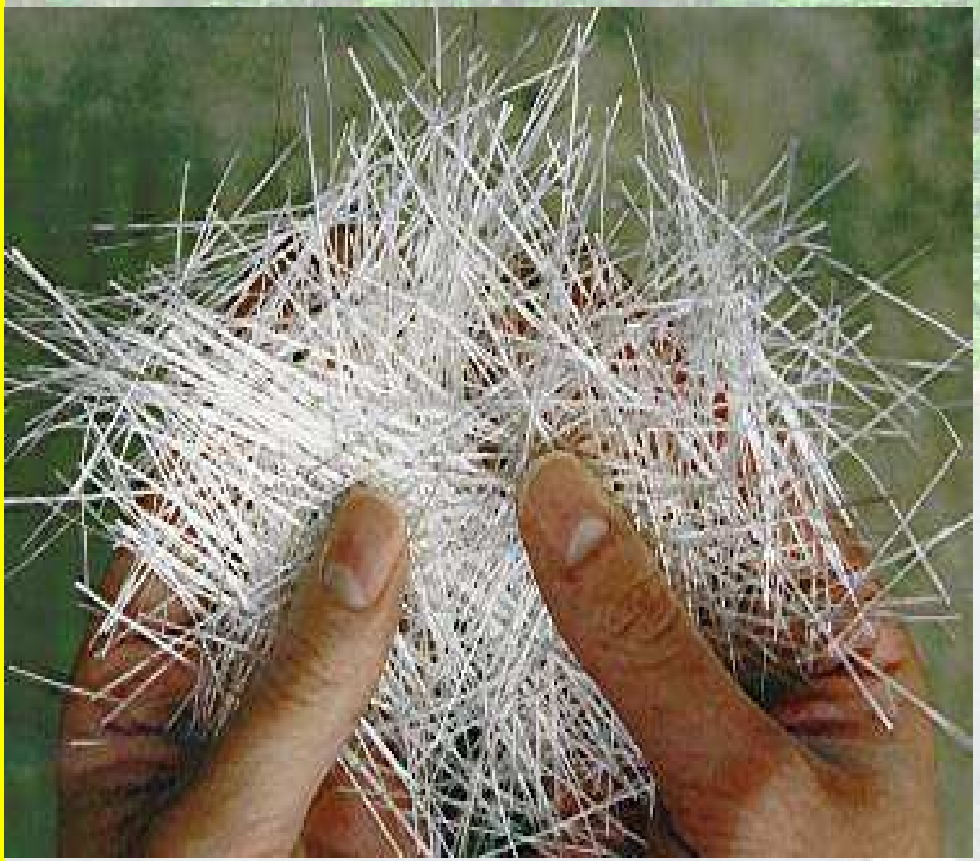
- Enhance tensile strength and reduce reflective cracking.
- Quickly applied and more easily shaped.
- Has great wearing as well as tensile properties.
- Used at various levels in the pavement structure.
- RECYCLABLE

FIBERMAT® PROCESS

Combine Emulsion with Glass Fibers

Asphalt Emulsions = *the waterproof membrane*

Glass Fiber Strands = *the ability to withstand stresses and give enhanced tensile properties*



EMULSION

- CRS-1p or CRS-2p
- Anionic have been used
- Must be modified
- Tighter specs than ASTM – ge

AGGREGATES

- VARIOUS STONE SIZES USED
- ¼ TO ½ INCH MOST COMMON
- LOCAL SPECIFICATIONS FOR CHIP SEALS
- TAKE CARE WITH THE % OF P200

COMPLETE THE PROCESS

Rolling and sweeping completes the treatment.
The surface can normally be opened to traffic within 15 minutes.

TYPE A

The finish produced is a skid-resistant wearing surface – **SAM (Stress Absorbing Membrane)**

TYPE B

This can then be used as a **SAMI (Stress Absorbing Membrane Interlayer)**, overlaid with a different wearing course such as HMA, NovaChip or Microsurfacing

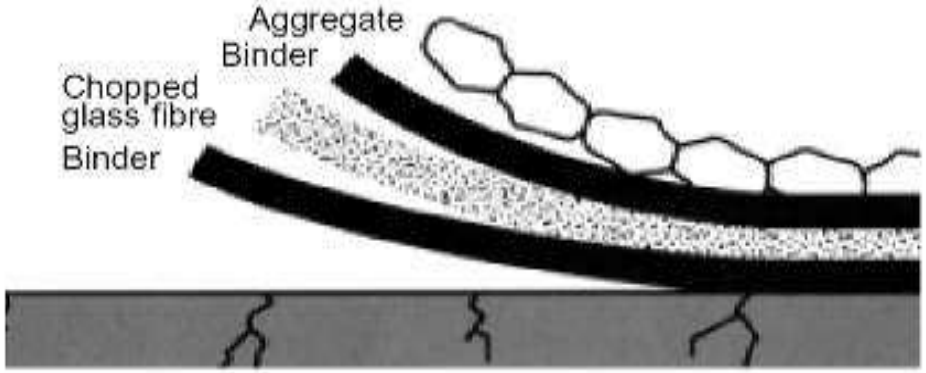
FIBERMAT® TYPE A & B

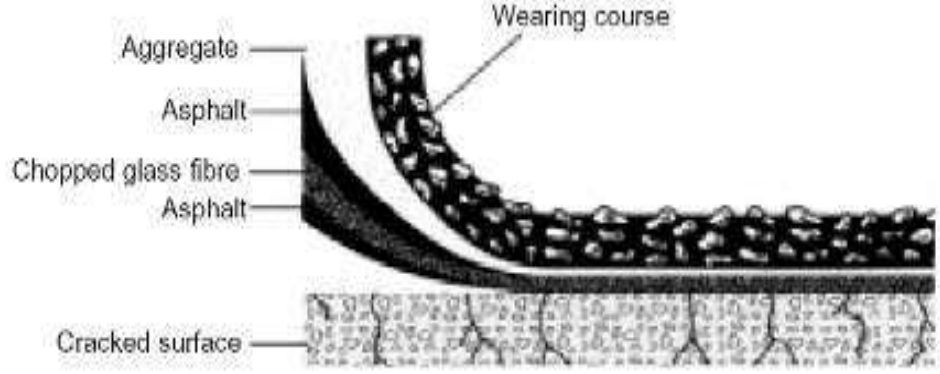
Type A

- Polymer Modified Asphalt Emulsion
  - ***0.4 – 0.6 gal/sy***
- Fiberglass
  - ***2 - 3 oz/sy***
- Aggregate
  - ***17 – 25 lbs/sy***
  - *½", 3/8" or* ***¼" and combination***

Type B

- Polymer Modified Asphalt Emulsion
  - ***0.35 – 0.45 gal/sy***
- Fiberglass
  - ***3 - 4 oz/sy***
- Aggregate
  - ***10 – 15 lbs/sy***
  - ***¼" blinding aggregate***





MACHINE HISTORY

Mini-Machine

4 foot wide unit used in the UK.

Truck mounted 8 foot wide unit

MACHINE HISTORY

Trailer mounted unit is 13 foot wide

FIBERMAT® MACHINE

Steerable trailer

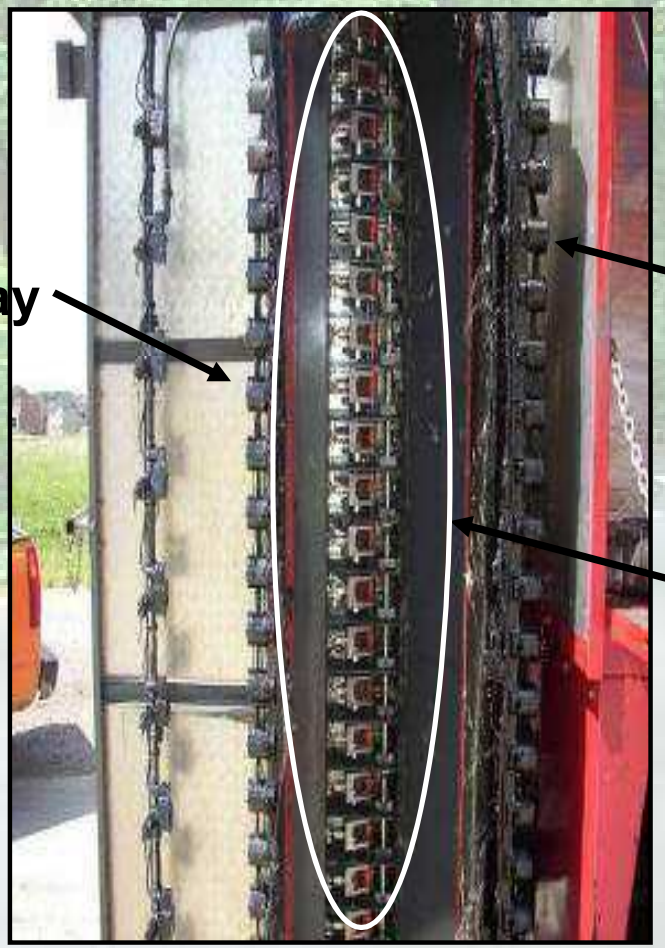
Computer Controls

Regulate production on the fly

Manage width in one foot increments

FIBERMAT® MACHINE

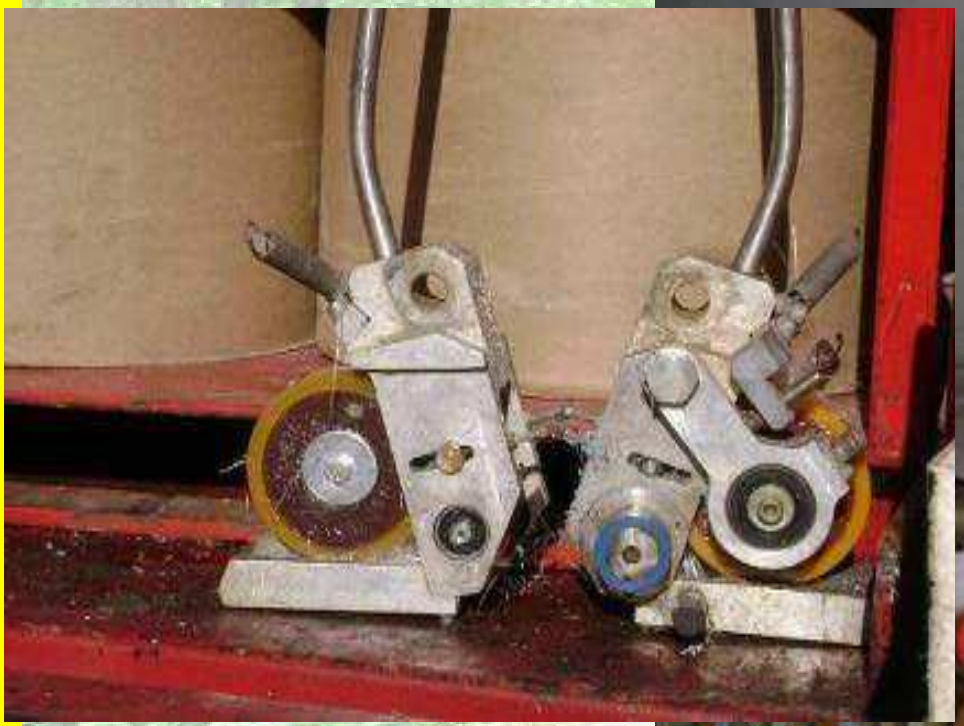
Easy to work on with folding bars



Underside of application unit

FIBERMAT® MACHINE

- Chopping Unit Close Up



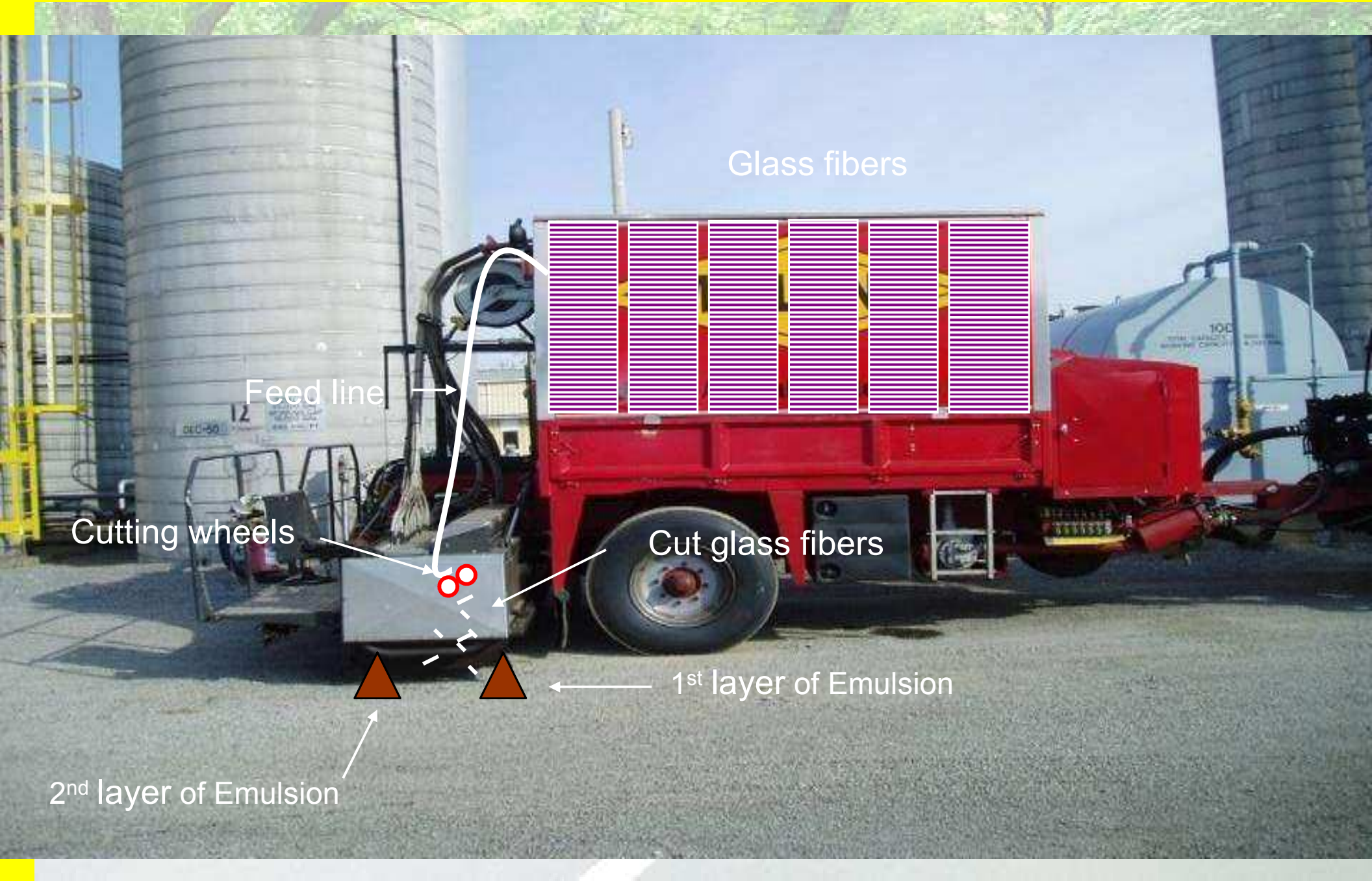
Red roller knife shears fiberglass strands

FIBER STORAGE

Enough for 40,000 sq yds without recharging

Pallets of fiberglass packaged in cardboard tubes

HOW IS IT APPLIED



FIBERMAT

QUICKLY APPLIED AND SHAPED EASILY

SLOAN CONSTRUCTION

Typical application speed is 220 - 260 ft /min

QUICKLY APPLIED AND SHAPED EASILY

Adjusts to your job site

TECHNICAL REPORTS

- Nottingham university, UK
- Ulster university, Ireland
- Lcpc, Autun, France
- New South Wales road transportation authority, Australia
- Rilem - 1996
- World congress on emulsions October 2006
- Penn State – PTI report on Fibermat type b March 2007
- Texas A&M – TTI report on Fibermat type b Oct 2007
- Ctaa – Niagara Falls, on November 2007
- Rilem Chicago, IL June 2008

EXECUTIVE SUMMARY

M.Thompson October 2007 Page 1 of 14

Evaluation of FiberMat® Type B as a Stress Absorbing Membrane Interlayer to Minimize Reflective Cracking in Asphalt Pavements

FIBERMAT

by

Arif Chowdhury, P.E.
Assistant Research Engineer
Texas Transportation Institute

And

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Senior Research Fellow
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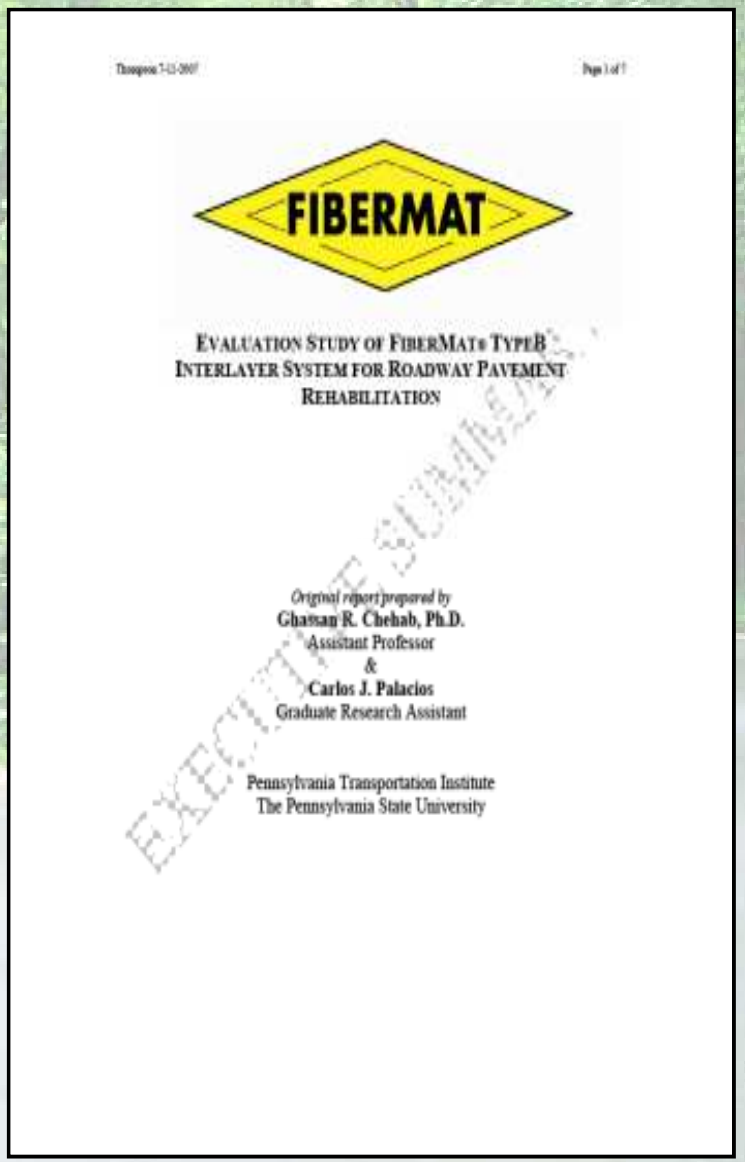
Texas Transportation Institute
Texas A&M University
College Station, Texas
September 2007

EXECUTIVE SUMMARY

Texas A & M Report



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FIBERMAT

EVALUATION STUDY OF FIBERMAT® TYPE B INTERLAYER SYSTEM FOR ROADWAY PAVEMENT REHABILITATION

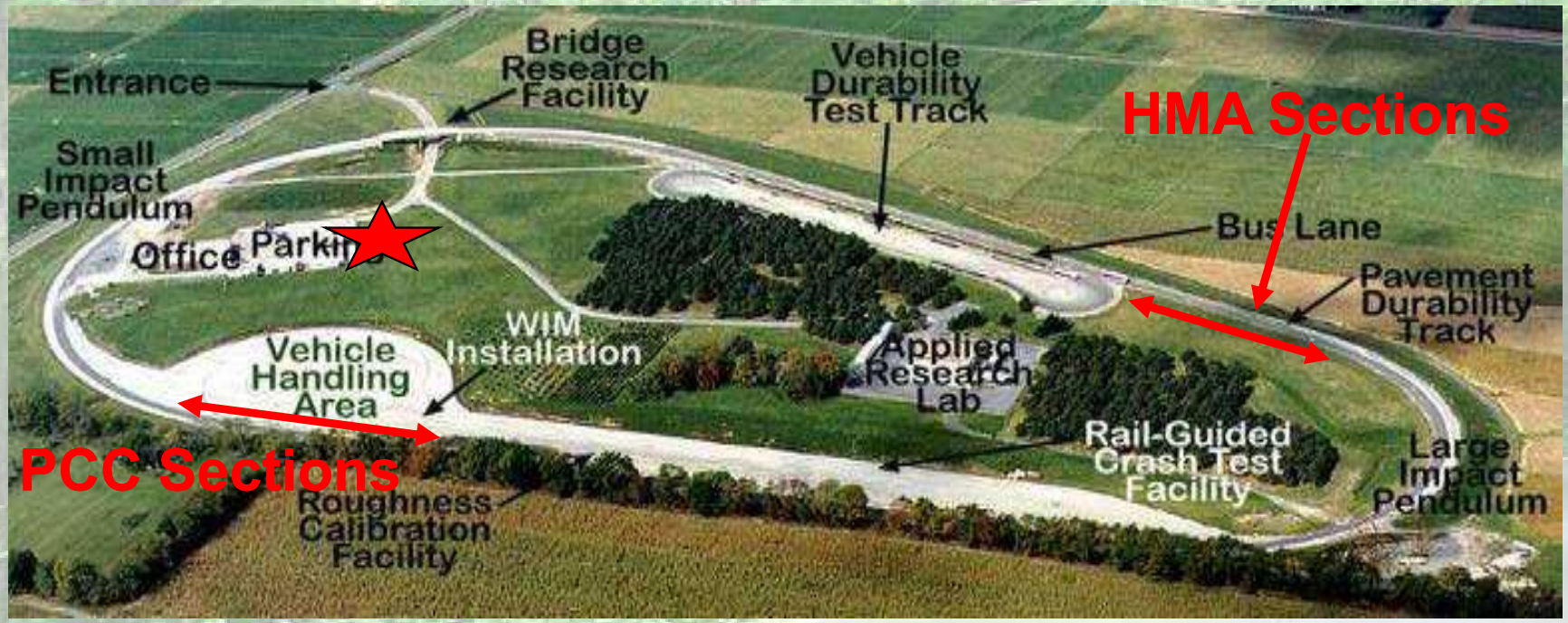
Original report prepared by
Ghassan R. Chehab, Ph.D.
Assistant Professor
&
Carlos J. Palacios
Graduate Research Assistant

Pennsylvania Transportation Institute
The Pennsylvania State University

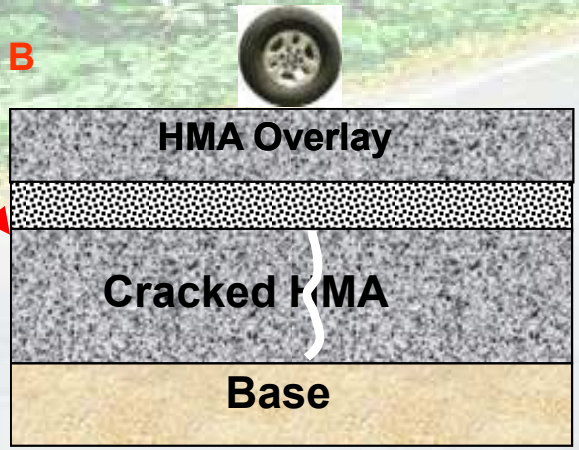
EXECUTIVE SUMMARY

Pennsylvania State Report

PENNSYLVANIA TRANS. INST. & PENN STATE TEST TRACK

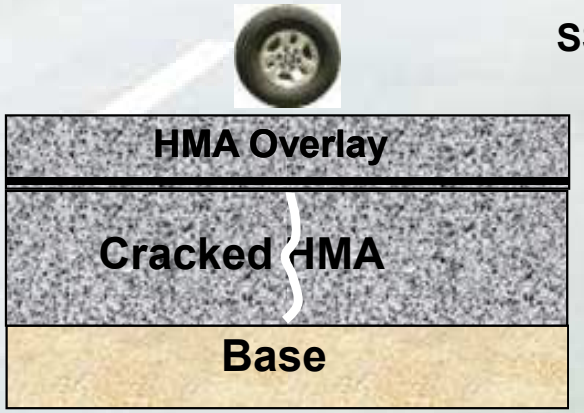


FiberMat® Type B



FiberMat Section

SS1H tack



Control Section

EXECUTIVE SUMMARY

FiberMat®
Type B
Interlayer
(crack stops)

Page 6 of Penn State Report

Control
Core Sample
(Crack continues)

TEXAS TRANS. INSTITUTE
TEXAS A&M

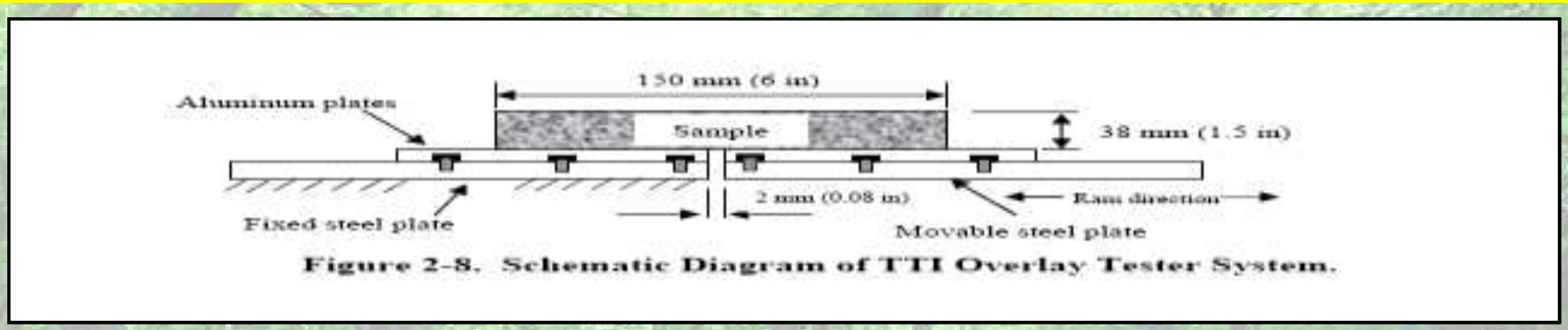


Figure 2-8. Schematic Diagram of TTI Overlay Tester System.

•Horizontal crack propagation along the FiberMat® interface rather than by cracking vertically above as in control samples.

•Generally, specimens containing FiberMat® improved cracking resistance in the small overlay testers 3 to 4 times more than control samples. The large overlay FiberMat® samples survived 14 times more compared to the control.

FIBERMAT® TYPE A – FIELD TEST
Groth Road in Murray, New York

FIBERMAT® TYPE A

CRS-2p

March 2004

LONGITUDINAL CRACKS REAPPEARED AFTER 6 MONTHS

FIBERMAT® TYPE A

CRS-2p

January 2005

SNOW PLOW DAMAGE AFTER 2ND WINTER

FIBERMAT® TYPE A – FIELD TEST
Groth Road in Murray, New York

January 2006

FURTHER SNOW PLOW DAMAGE & WATER PUMPING AFTER 3RD WINTER

January 2007

DAMAGE CONTINUED NOW WATER IS PUMPING FROM SUBBASE

June 2008

REPAIRS NEEDED IN ORDER TO MAINTAIN PUBLIC SAFETY

FIBERMAT® TYPE A – FIELD TEST
Groth Road in Murray, New York

FIBERMAT® TYPE A

CRS-2p

October 2009

RULE OF THUMB

For every one inch of HMA you get one years delay in reflective cracking

What if you could get three, four or even five years delay in reflective cracking?

WHAT IF?

What if you could maintain the water proofing characteristics of your surface treatments three, four or five years longer?

BENEFITS TO CUSTOMER

Public Safety

Speed and efficiency of application

- Initial construction speed minimizes lane closure
- Open to traffic quickly minimizing disruption to the public

Improved surface friction characteristics

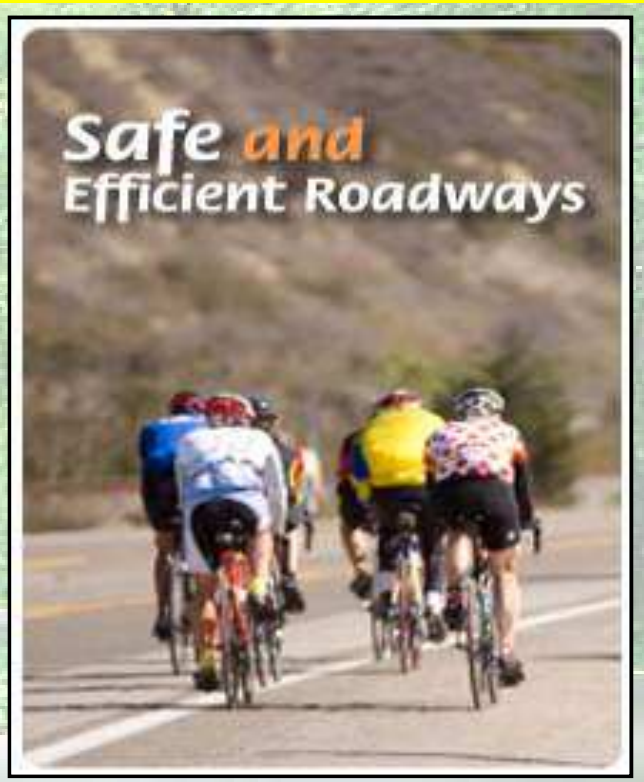
- Safer driving conditions in good and bad weather

Waterproofs surface preventing damage to sub base

- Maintains ride quality longer
- Maintains safe driving surface (slow pothole development)

Improves Customer relations

- Reduces public complaints due to poor road conditions
- Great First Impression



BENEFITS TO YOU

Cost Effectiveness

Speed and efficiency of application

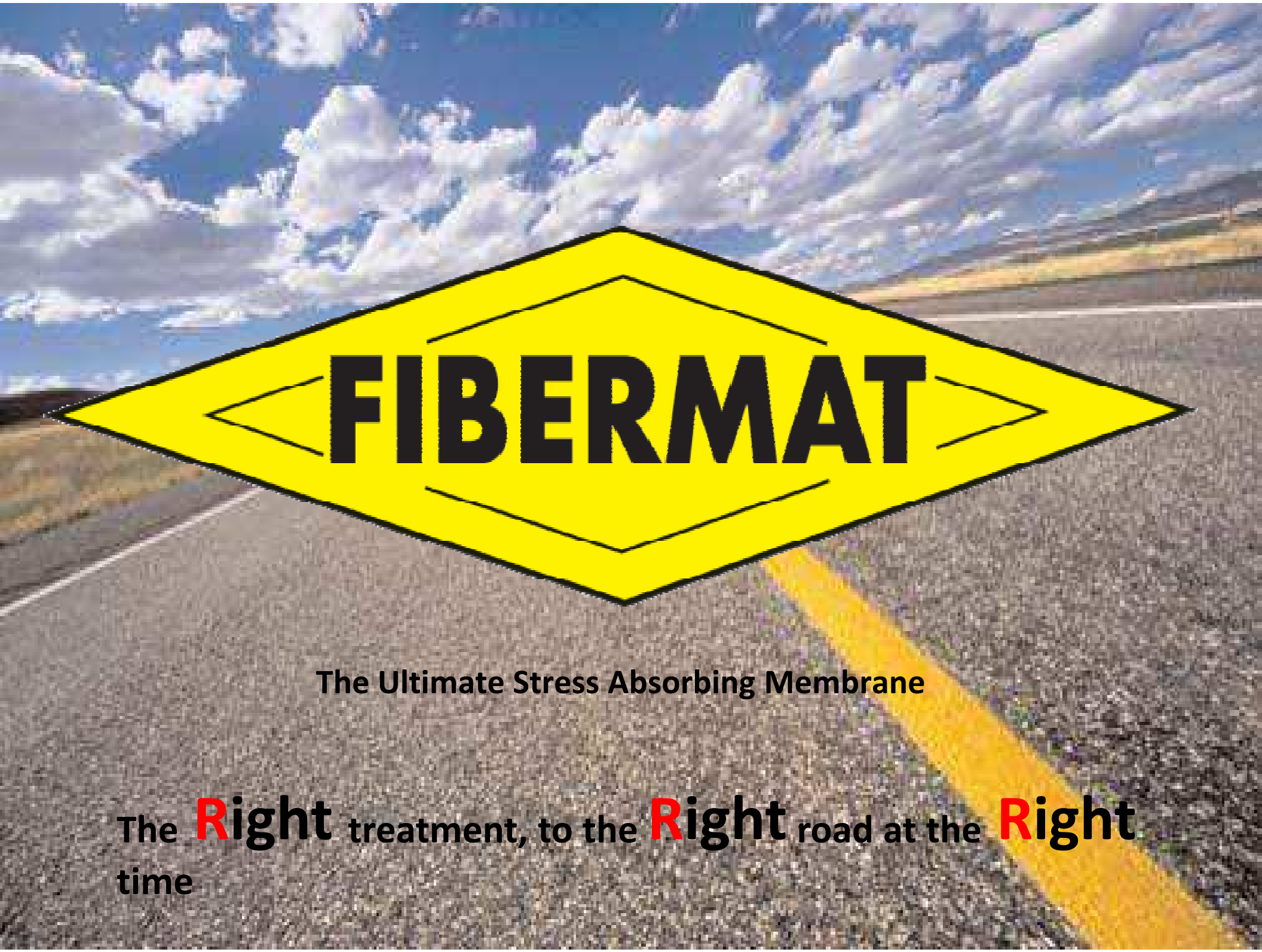
- Lower labour costs vs. competitive products
- Speed of process reduces crew & equipment costs on road
- Reduces exposure to potential liability

Waterproof surface preventing damage to sub base

- Extends pavement life
- Maintains ride quality longer
- Maintains safe driving surface (slow pothole development)

Slows propagation of reflective cracks

- Extends pavement life
- Extends life of overlay surface treatment
- Maintains waterproofing characteristics for longer life


FIBERMAT
The Ultimate Stress Absorbing Membrane
The Right treatment, to the Right road at the Right time