aspha-min®

Sasobit®

EVOTHERM

WARM MIX ASPHALT TECHNOLOGY

WARM MIX ASPHALT

Missouri's Experience

As told by

Joe Schroer, PE

November 29, 2006

MoDOT

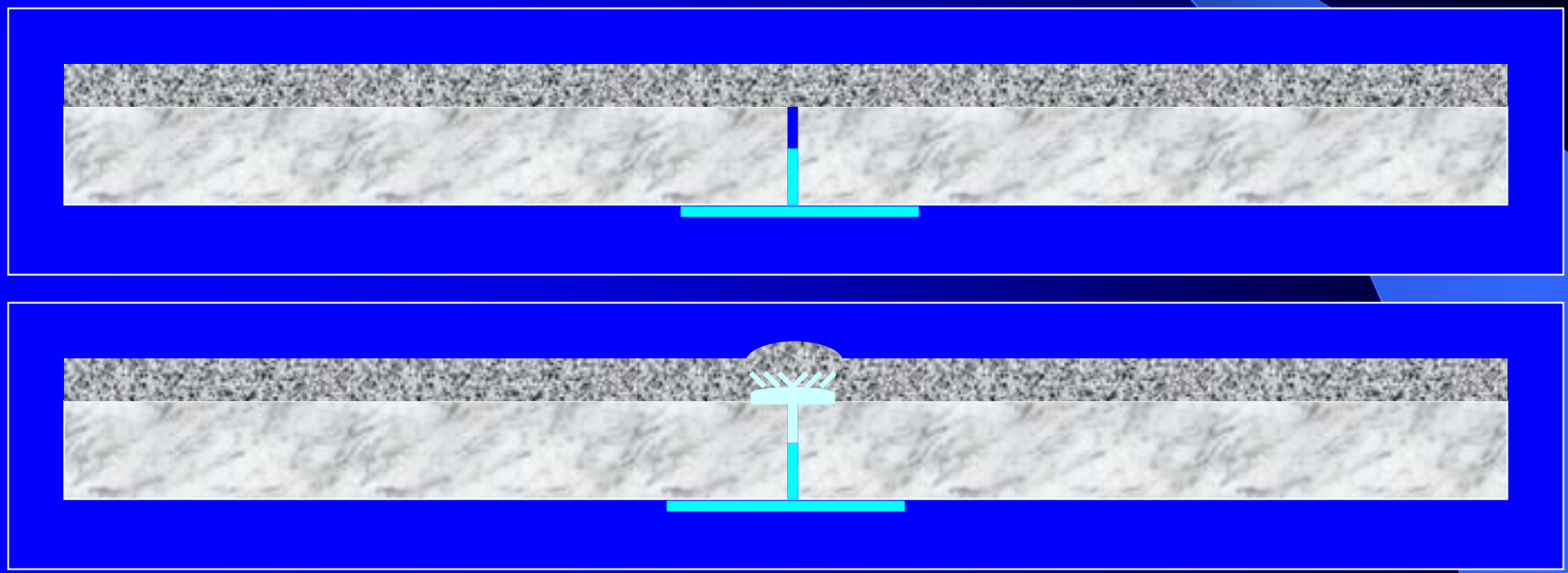
Why Warm Mix?

- Joint bump problems.

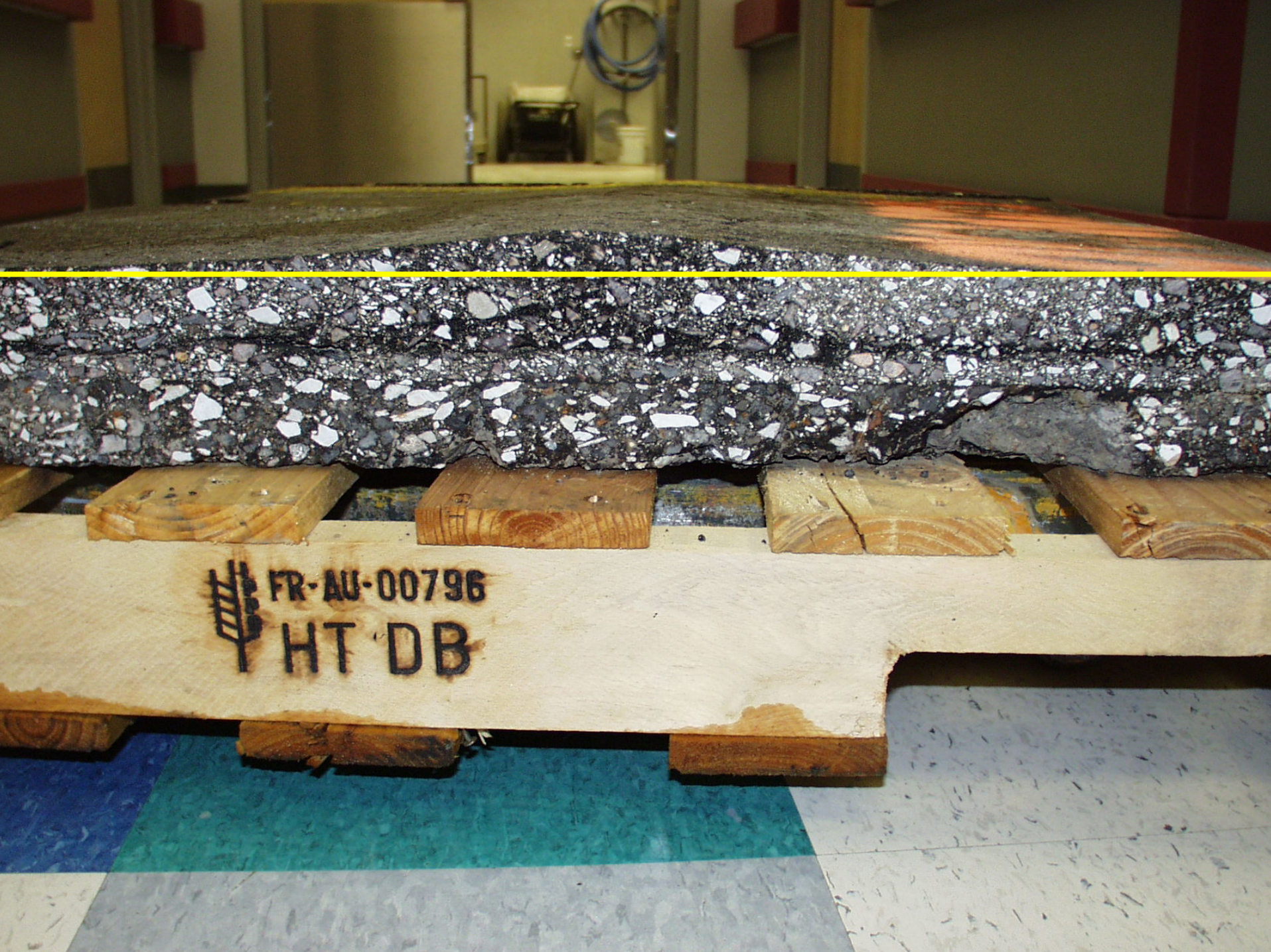
- Contractor initiated solution.

Heat - Filler

Heat - Moisture




410G
JOHN DEERE


FR-AU-00796
HT DB


Joint Bump
Original Lift


The Hubbard Group
P.O. Box 547217
Orlando, FL 32854
Barry McKeon
1-800-476-1228
ASPHA-MIN
EVOTHERM
SASOBIT

Specification Changes

- **NONE!**
- Percent Within Limits (PWL)
  - VMA
  - Air Voids
  - Asphalt Content
  - Density
- TSR

Warm Mix Additives

How do they work?

SASOBIT

- Paraffin-wax compound
- Small crystalline structure
- Reduces brittleness at lower temperatures
- “Asphalt flow improver”
- Lowers viscosity of liquid asphalt

EVOTHERM

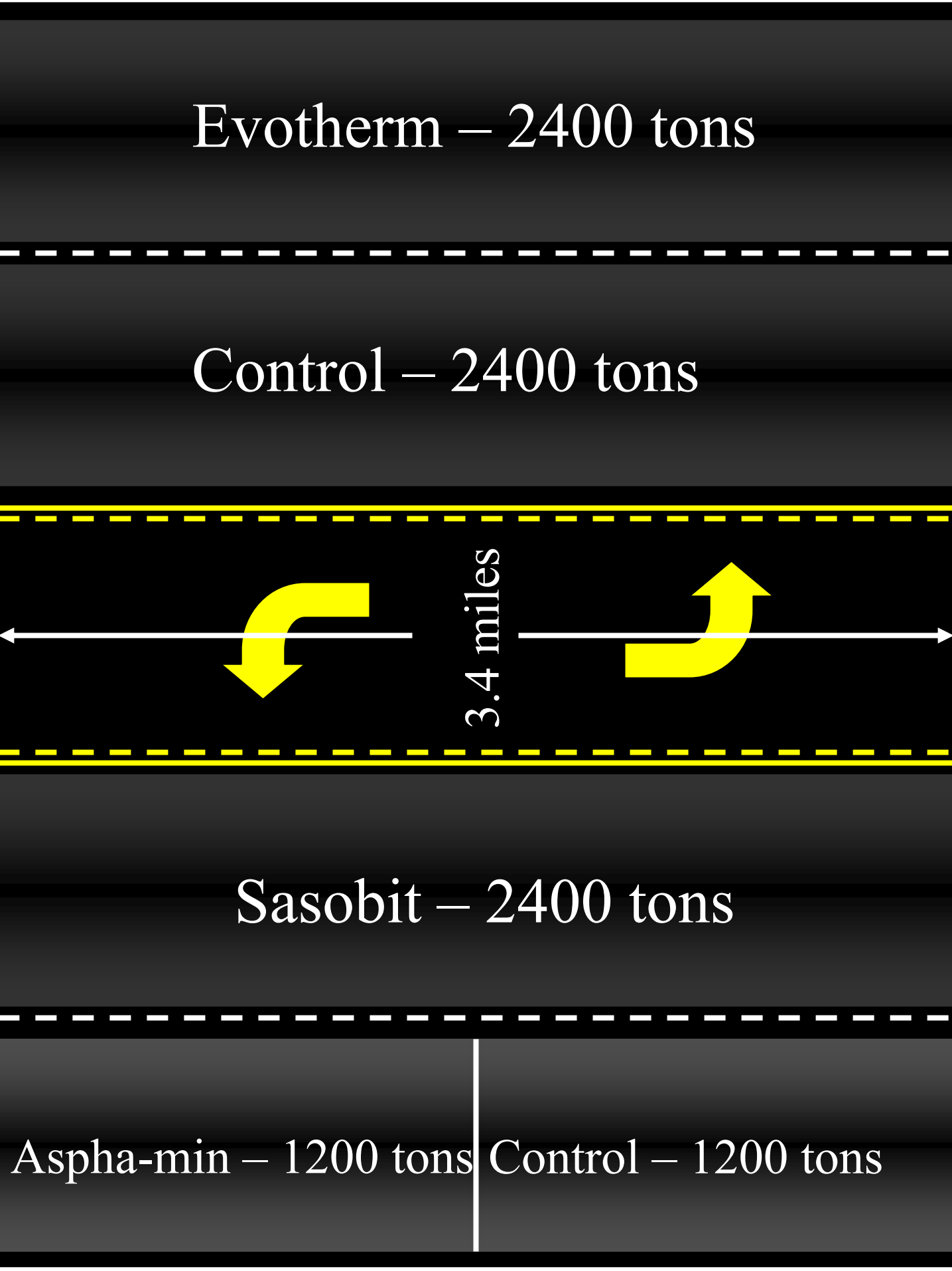
- Emulsified Asphalt
- Chemical Package
  - Emulsification agent
  - Improved coating and workability
  - Adhesion promoter
- High residue content
- Emulsion is liberated in the form of steam

ASPHA-MIN

- Synthetic sodium aluminum silicate
- a.k.a – Zeolite
- Crystalline structure with large interconnected spaces
- 21 percent water by mass
- Release of water microscopically foams the asphalt

Project Information

- 12.5 mm Superpave Design
- 100 gyrations
- PG 70-22 – polymer modified
- 1 ¾ inch overlay
- AADT = 22,000
- 10% Trucks


Evotherm – 2400 tons
Control – 2400 tons
3.4 miles
Sasobit – 2400 tons
Aspha-min – 1200 tons
Control – 1200 tons

SASOBIT
2 – 1200 Ton Test Sections

- First section
  - 280°F behind paver
  - Average density 93.2
- Second section
  - 240°F behind paver
  - Average density 93.1

EVOTHERM
2 – 1200 Ton Test Sections

- First section
  - 300°F behind paver
  - Average density 91.8
- Second section
  - 240°F behind paver
  - Average density 94.5

ASPHA-MIN
2 – 600 Ton Test Sections

- First section
  - 300°F behind paver
  - Average density 93.6
- Second section
  - 240°F behind paver
  - Average density 93.8

TSR

	MoDOT
CONTROL	92
SASOBIT	95
EVOTHERM	89
ASPHA-MIN	76

APA – RUT RESULTS

	300°F	240°F
CONTROL	3.1 mm	-
SASOBIT	2.2 mm	2.6 mm
EVOTHERM	2.7 mm	3.5 mm
ASPHA-MIN	3.1 mm	-

Binder Properties

	DSR	Penetration	Viscosity
CONTROL	2.42	30	19,488
SASOBIT	3.32	32	25,461
EVOTHERM	2.66	36	10,764
ASPHA-MIN	2.09	36	12,816

Performance

	Average Rut Depth (mm)
Control (Turn Lane)	0.4 mm
Control	1.1 mm
Sasobit	0.8 mm
Evotherm	1.1 mm
Aspha-Min	0.3 mm

Cost/Benefit

- Warm mix additive $3.00 per ton
- Fuel Savings ≈ $0.35 to $0.40 per ton
- Environmental benefit $?.??
- Benefits from reduced oxidation $?.?? per ton


°F
221.5


STOP
Ingersoll Rand

Summary

- Goal Accomplished
- Performance Approximately Equal
- Allowable Substitution
  - More Expensive
  - Cost Trade-Off
- Extend Asphalt Season
- Environmental Advantages