



Alabama OGFC Study
E9 & E10 Sections
Fan Gu

SEVENTH
RESEARCH CYCLE

NCAT TEST TRACK CONFERENCE

OGFC Mix Design Modification

- **Typical ALDOT OGFC Mix**

- 12.5 mm NMAS with 6% PG 76-22 asphalt + 0.3% cellulose fiber

- **E9A Section**

- 9.5 mm NMAS with 6% PG 76-22 asphalt + 0.3% cellulose fibers

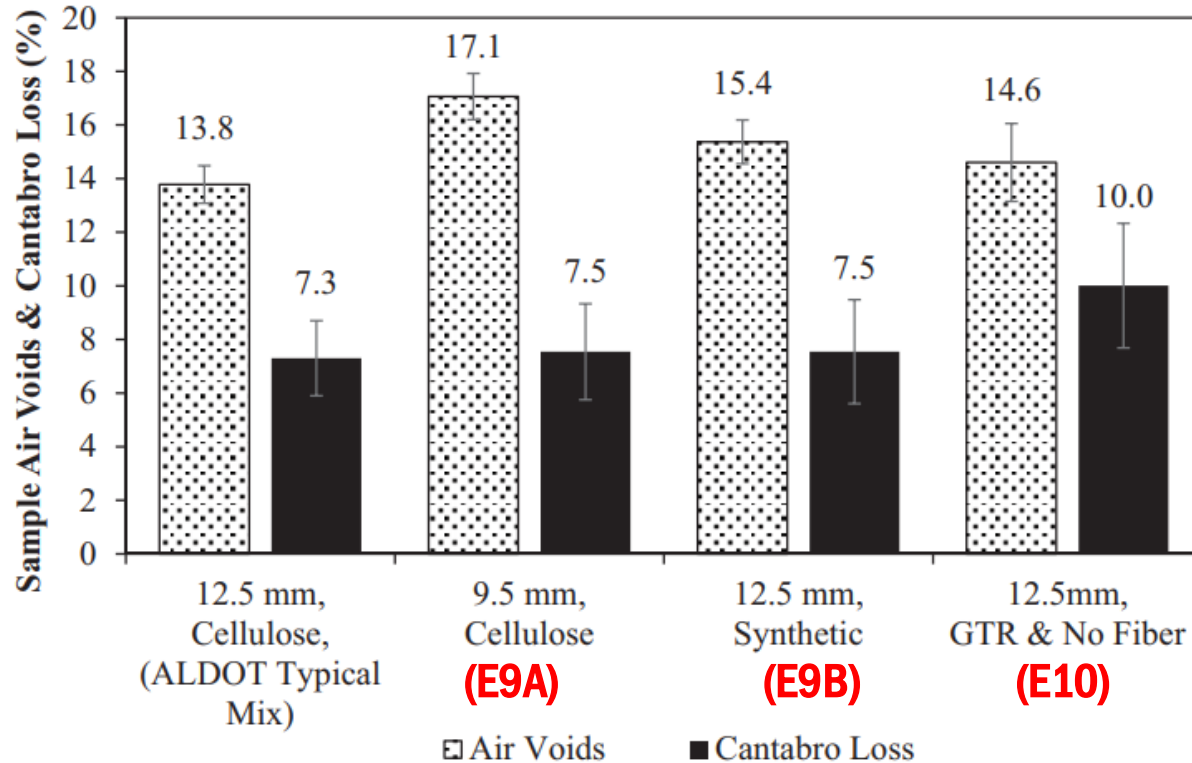
- **E9B Section**

- 12.5 mm NMAS with 6% PG 76-22 asphalt + 0.05% synthetic fibers

- **E10 Section**

- 12.5 mm NMAS with 6.3% GTR binder (ARB-12) + no fiber

Laboratory Test - Cantabro

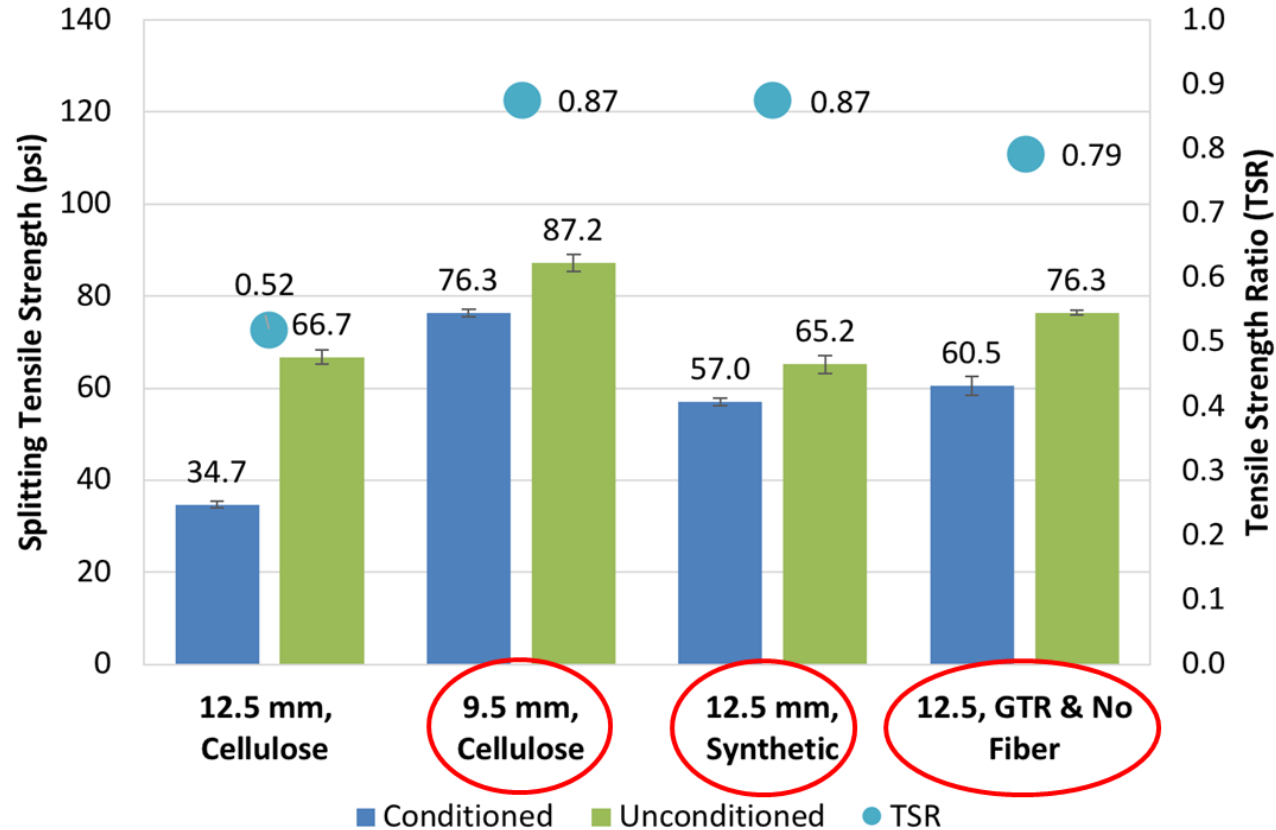


NCHRP 1-55 Performance Criteria:

- Air voids $\geq 15\%$ (Corelok Method)
- Cantabro loss $\leq 20\%$

ALDOT typical mix had lower air voids

Laboratory Test - Tensile Strength Ratio

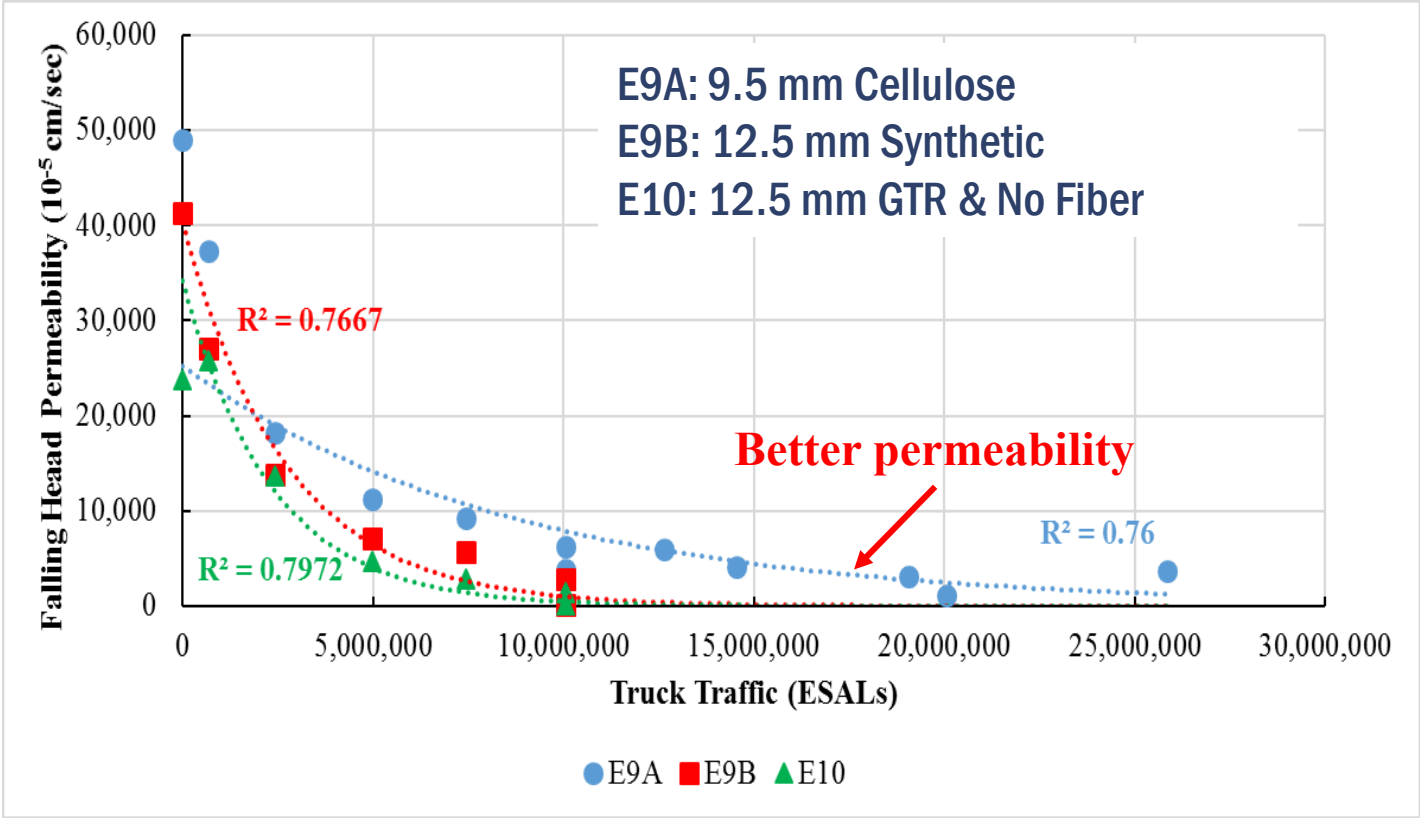


NCHRP 1-55 Performance Criteria:

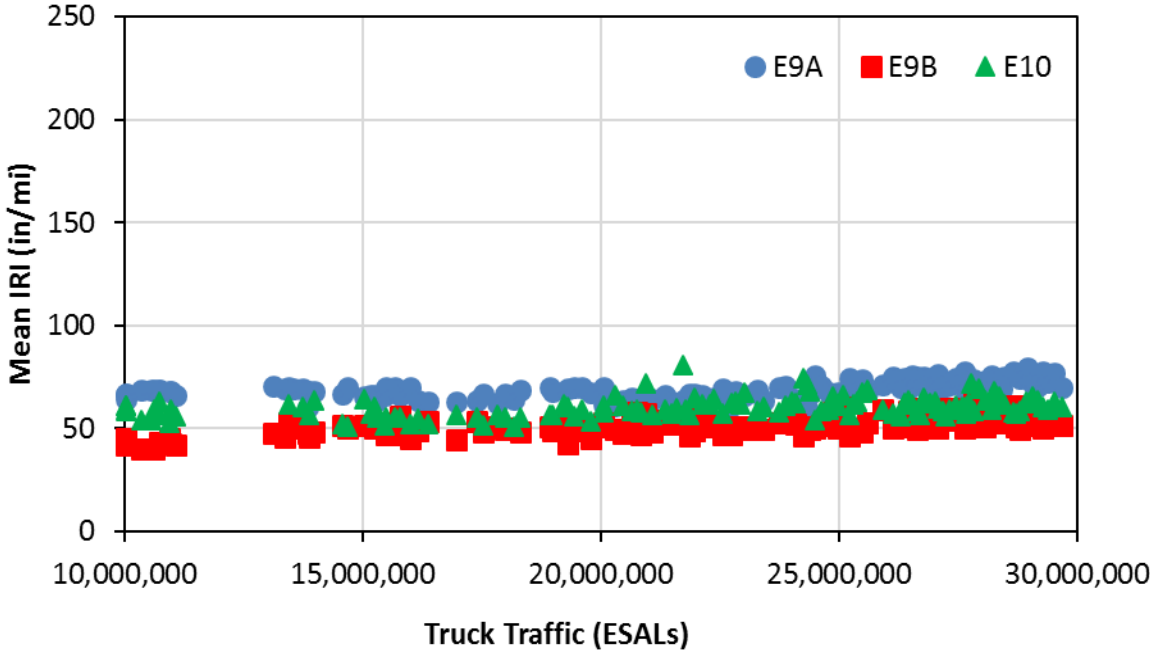
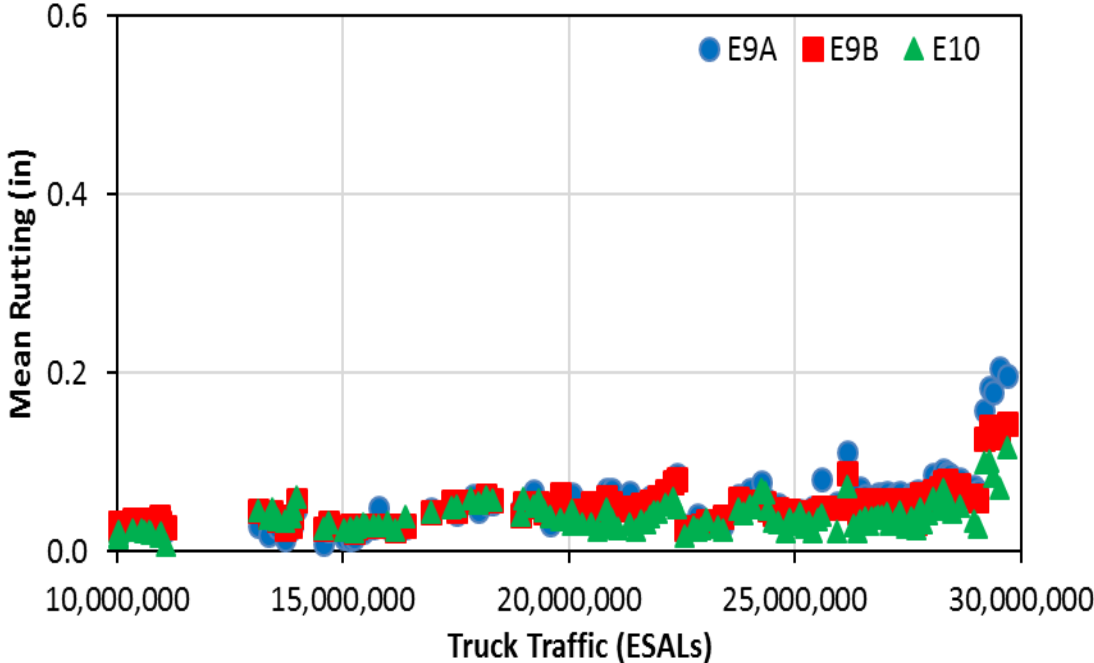
- Conditioned ITS \geq 50 psi
- TSR \geq 0.70

ALDOT typical mix failed the moisture susceptibility requirements.

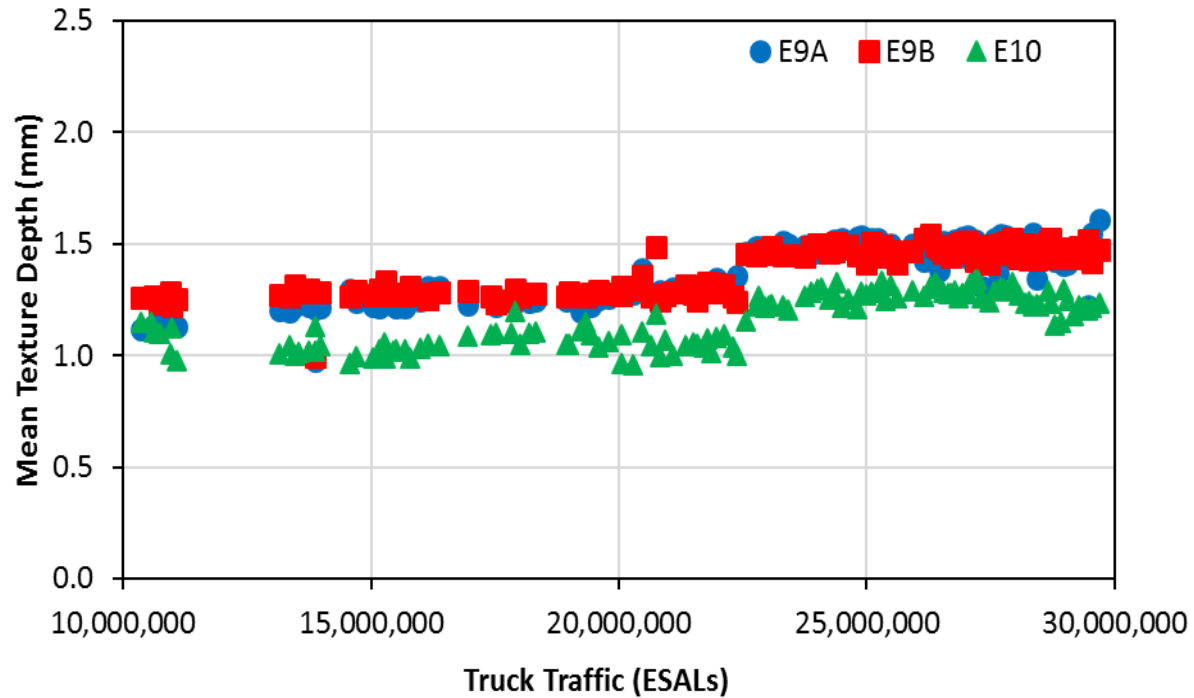
Field Performance - Permeability



Field Performance – Rutting & IRI



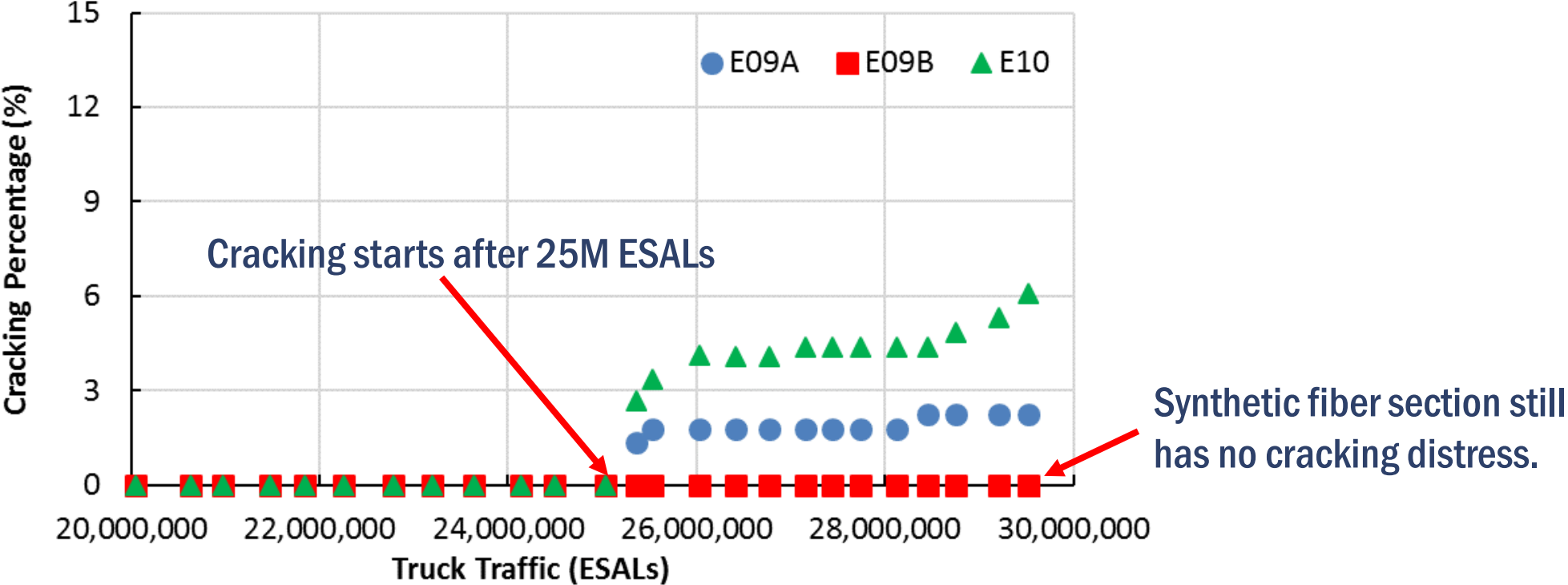
Field Performance – Texture



Raveling will result in an increase of surface macrotexture.

Surface macrotexture increases after 23 Million ESALs of trafficking.

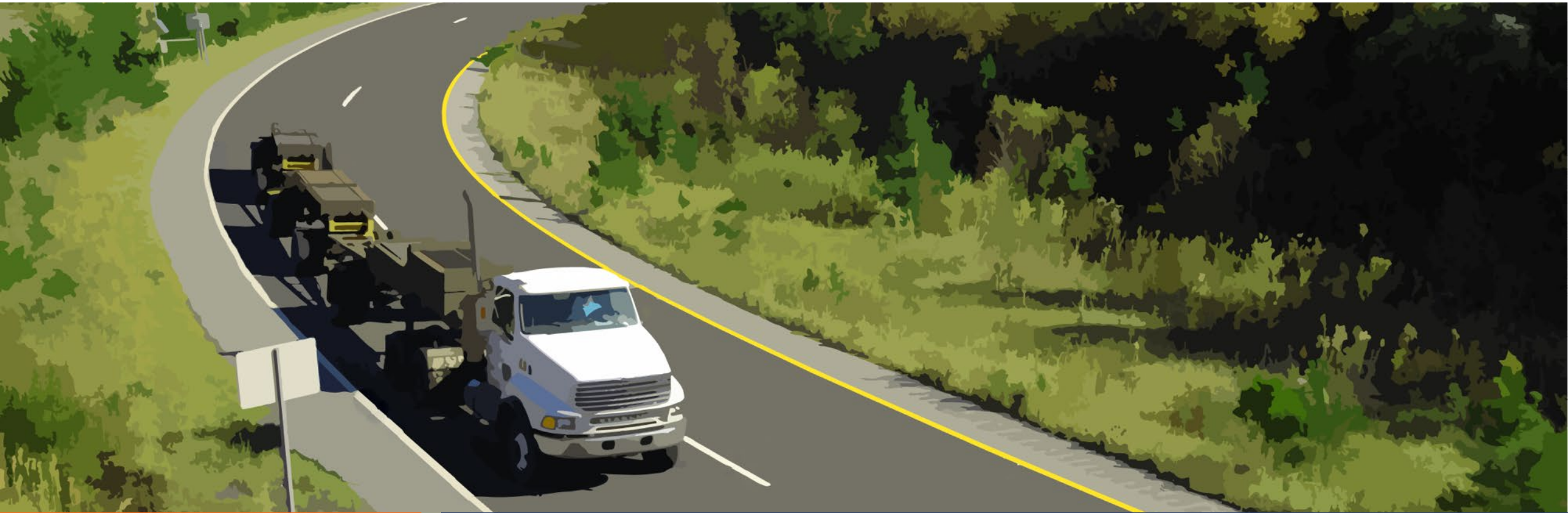
Field Performance - Cracking



Findings

- The roughness of the test sections was consistent throughout the past three research cycles. The three sections showed excellent rutting and cracking resistance from 2012 through 2021 after approximately 30 million ESALs.
- The 9.5 mm mixture in Section E9A exhibited a greater field permeability and lower rate of permeability degradation compared to the 12.5 mm mixes in Sections E9B and E10.
- Based on the field evaluation performance, adjustments made in the three modified OGFC mixtures can potentially improve the long-term field performance of OGFC mixtures in Alabama.

Questions and Answers



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GA Reflective Cracking Study N12 & N13
Sections
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Reflection Cracking Treatments

□ N12 Section

- GlasGrid
- PETROMAT paving fabrics
- Chip seal with virgin aggregate (7# stone)

□ N13 Section

- Chip seal with coarse RAP
- Rubber modified asphalt mix (12.5 mm)
- OGI (12.5 mm)

Research Objective

- Evaluate the long-term performance of different reflective cracking treatments
- Determine the most cost-effective approach to mitigate reflective cracking

Construction Summary

□ Saw Cuts to Simulate Cracks

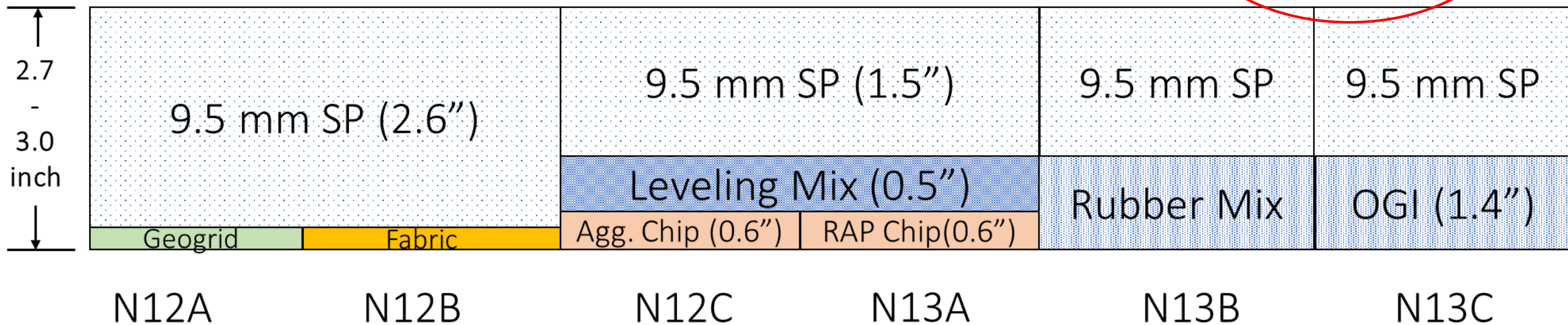


- Mill to 2.2 inch depth
- Deep cuts 1/8 inch wide
- Longitudinal cuts at 3 foot spacing
- Transverse cuts at 15 foot spacing
- Filled with sand to prevent healing

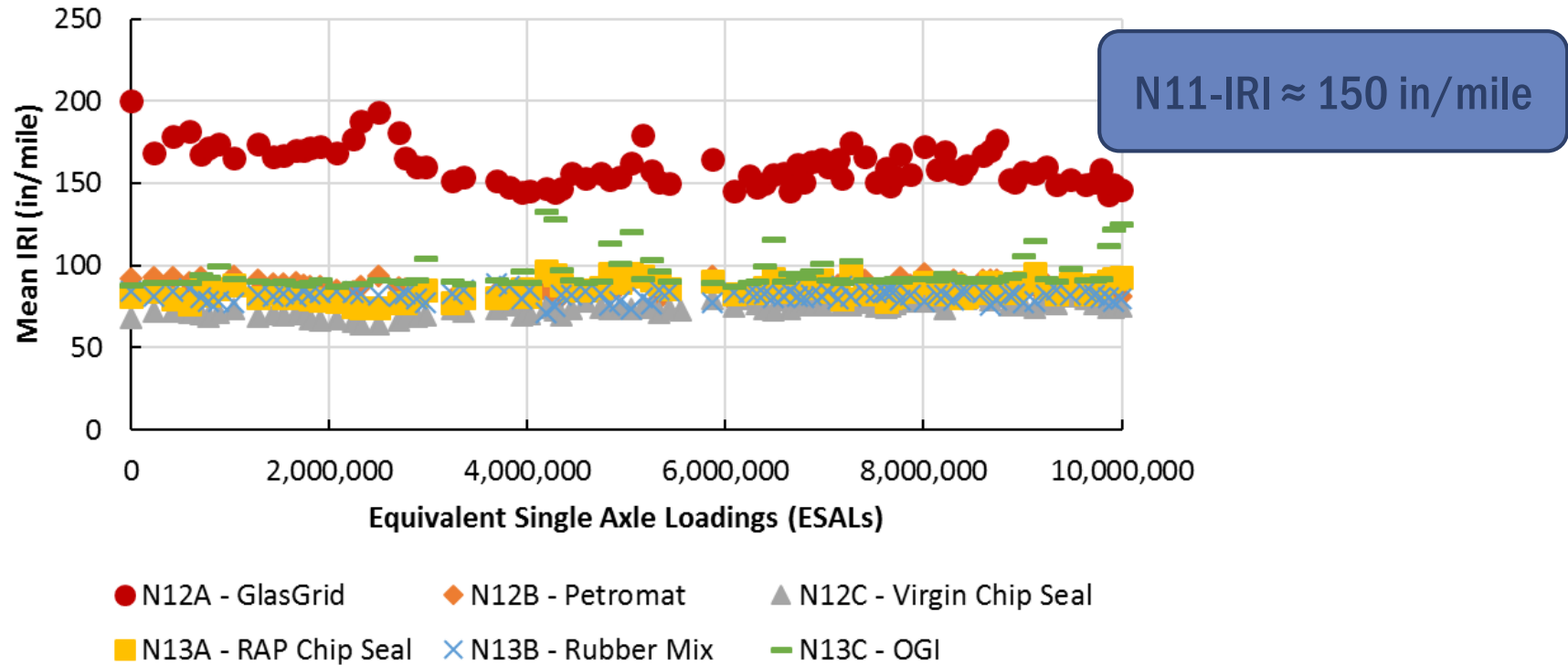
Construction Summary

□ Section Structures

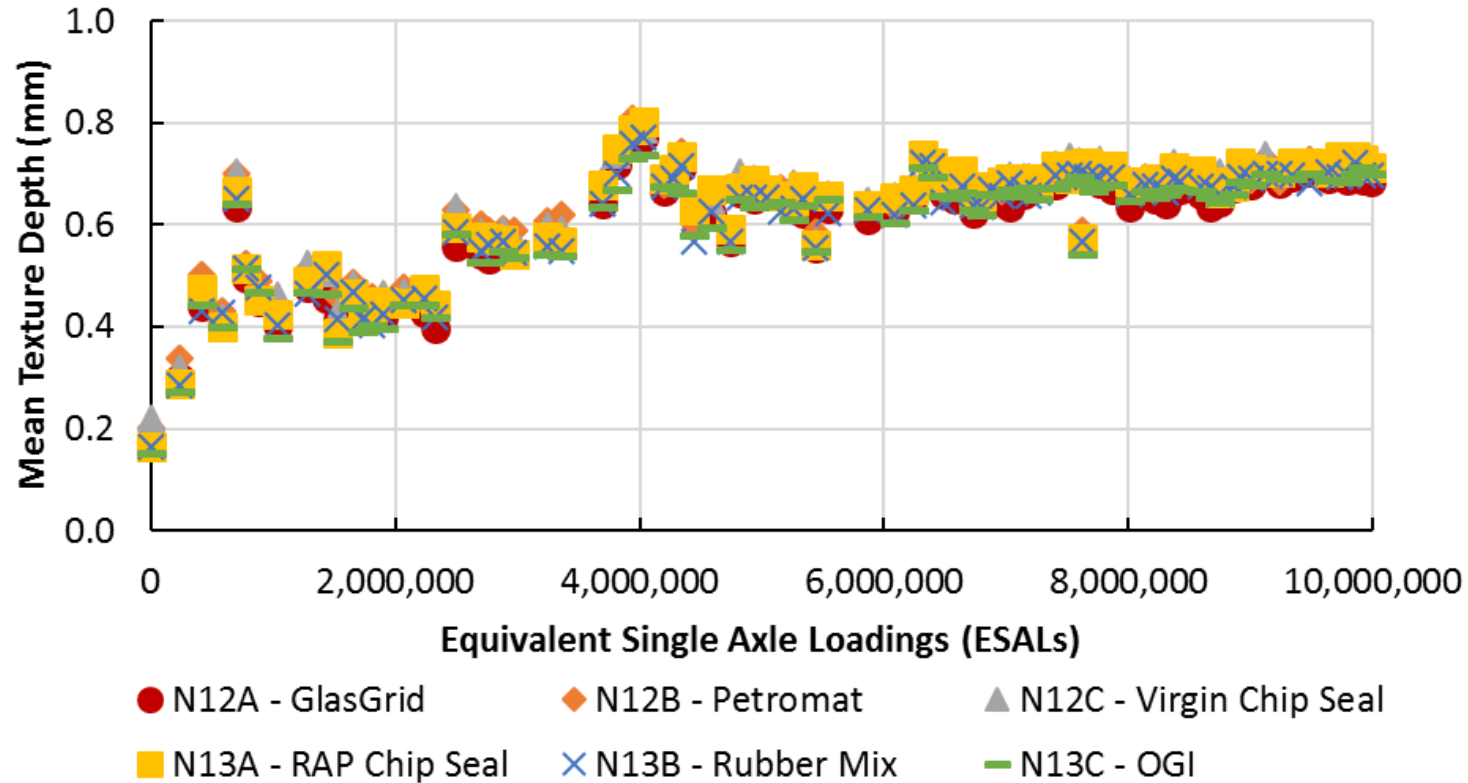
2012 Cycle
OGI Thickness: 1.2"
Overlay: 1.1-1.5"



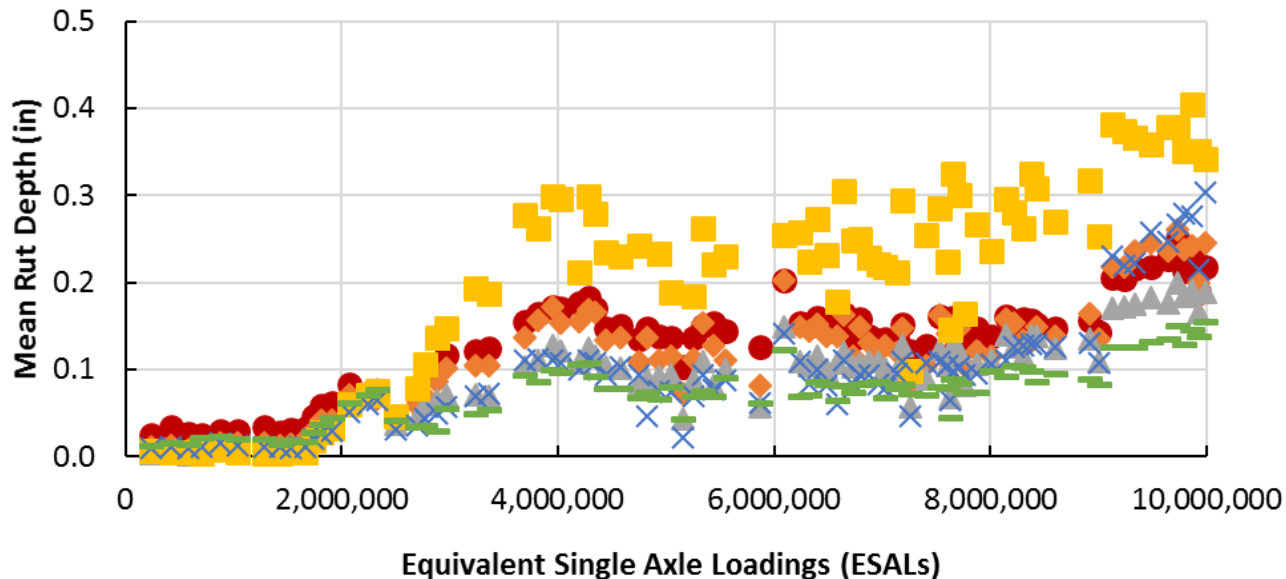
Field Performance – Ride



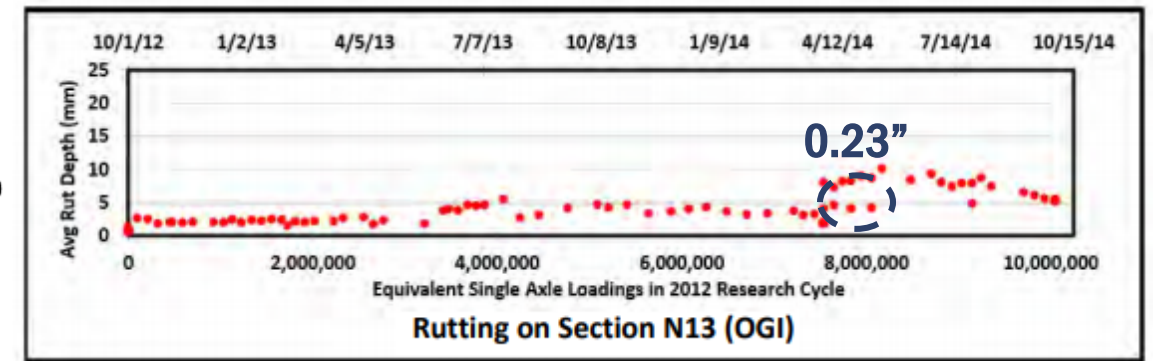
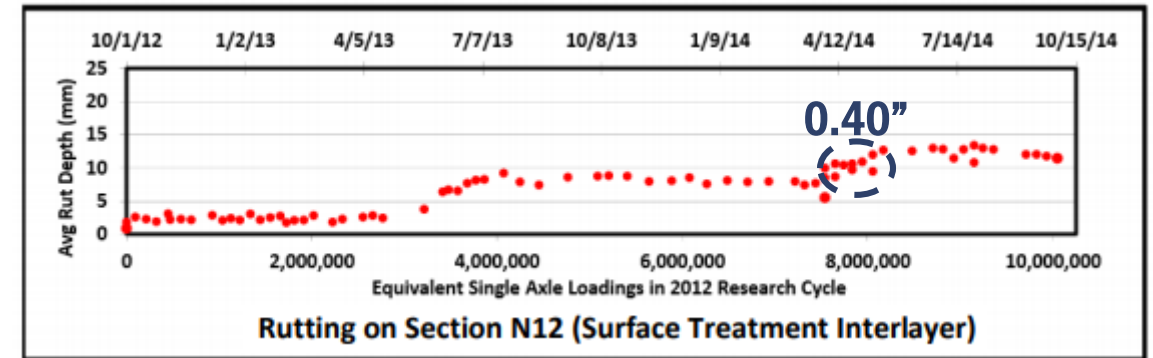
Field Performance – Surface Texture



Field Performance – Rutting



- N12A - GlasGrid
- ◆ N12B - Petromat
- ▲ N12C - Virgin Chip Seal
- N13A - RAP Chip Seal
- × N13B - Rubber Mix
- N13C - OGI



2012 Research Cycle

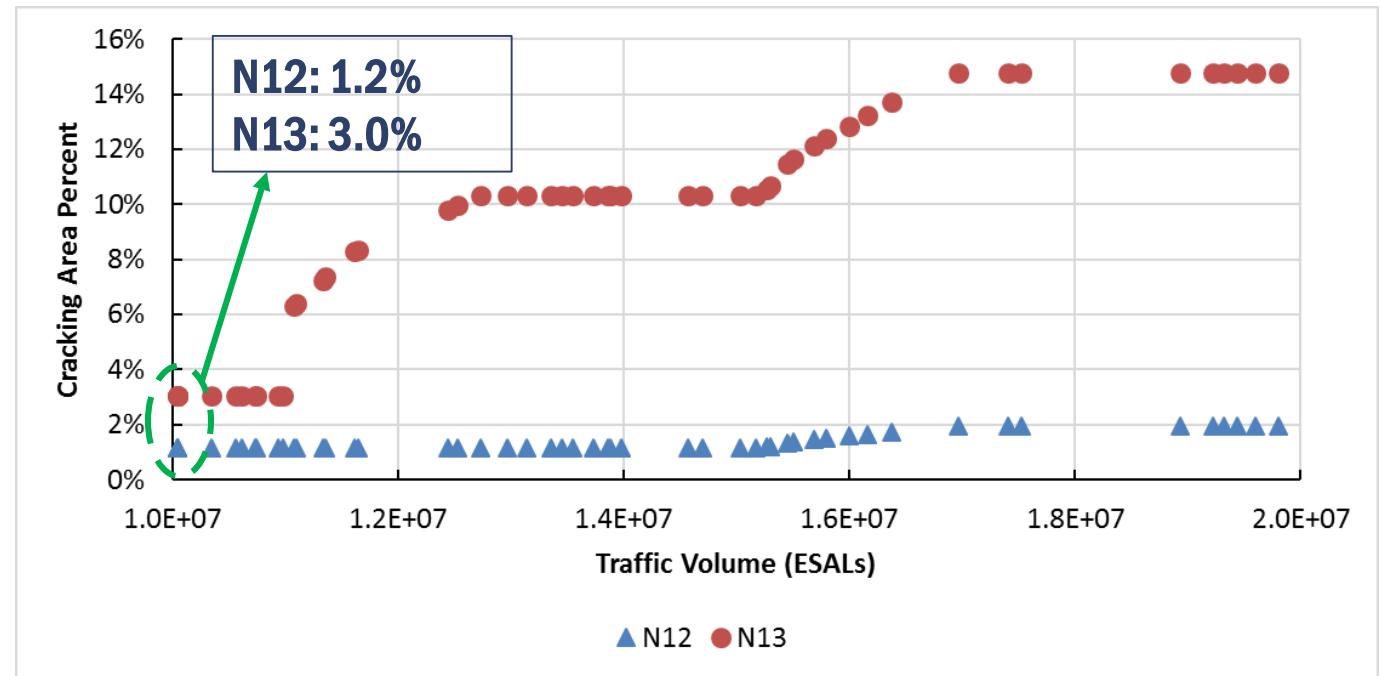
Field Performance – Cracking

This Cycle

No cracking distress after
10M ESALs

Cracking Measurement
Last Cycle: Manual painting
This Cycle: Automated system

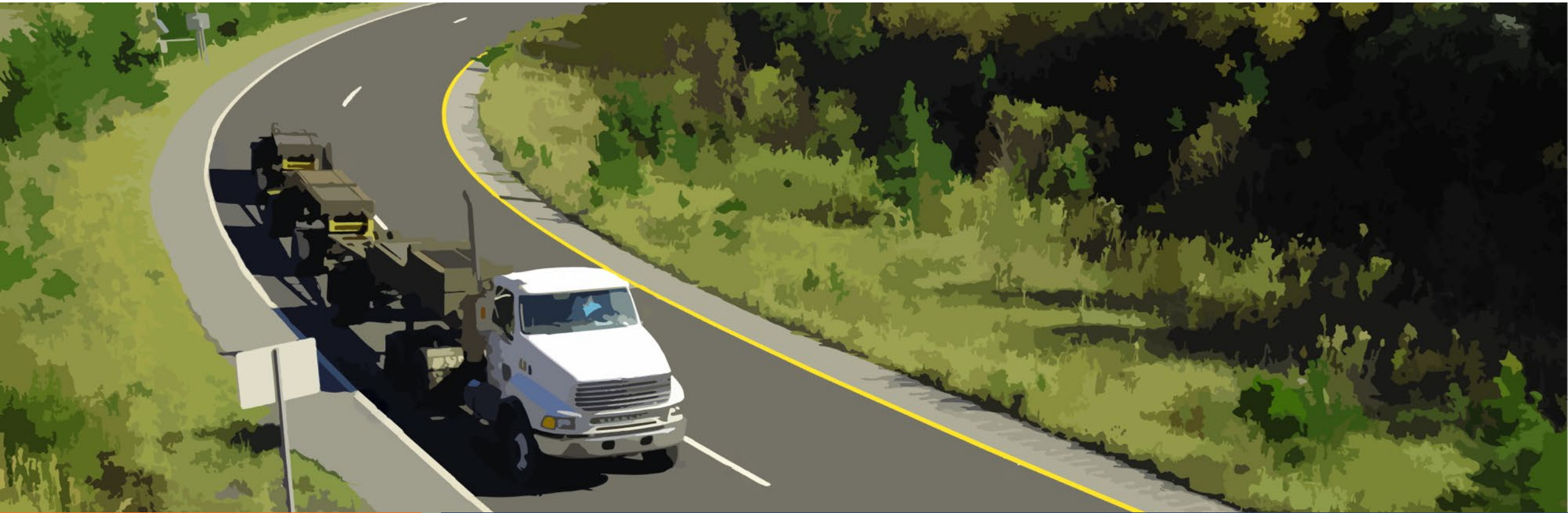
Last Cycle



Findings

- The surface roughness of these six subsections do not have any substantial change after 10 million ESALs of trafficking.
- The RAP chip seal subsection (N13A) has a greater rut depth than other subsections. After 10 million ESALs of trafficking, the RAP chip seal subsection (N13A) has a rut depth close to 0.4 inch.
- There is still no reflective cracking distress that could be observed on any surface of these subsections.

Questions and Answers



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WVDOT Friction Study
W4 & W5 Sections
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Research Background

WVDOH Standard Specification Section 402

*ASPHALT SKID RESISTANT PAVEMENT: ...if the projected traffic is greater than 3 million ESALs, dolomite shall **not exceed 50%** of the coarse aggregate (+ No. 4)...*

- W4- 70% dolomite
- W5- 90% dolomite

Research Objective

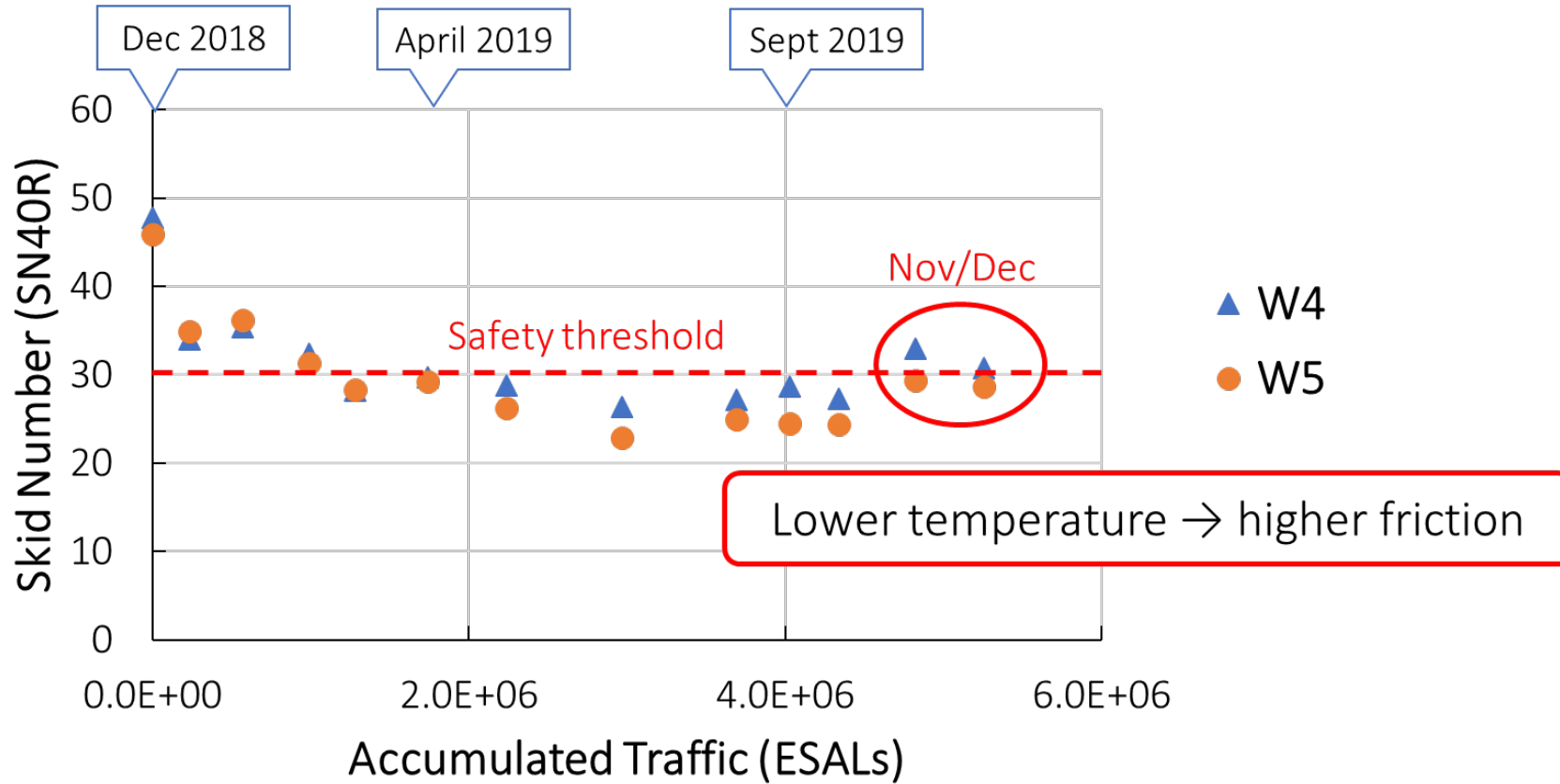
- How does an increase in the amount of dolomite impact the surface friction characteristics of West Virginia DOH mixtures?

Mix Design

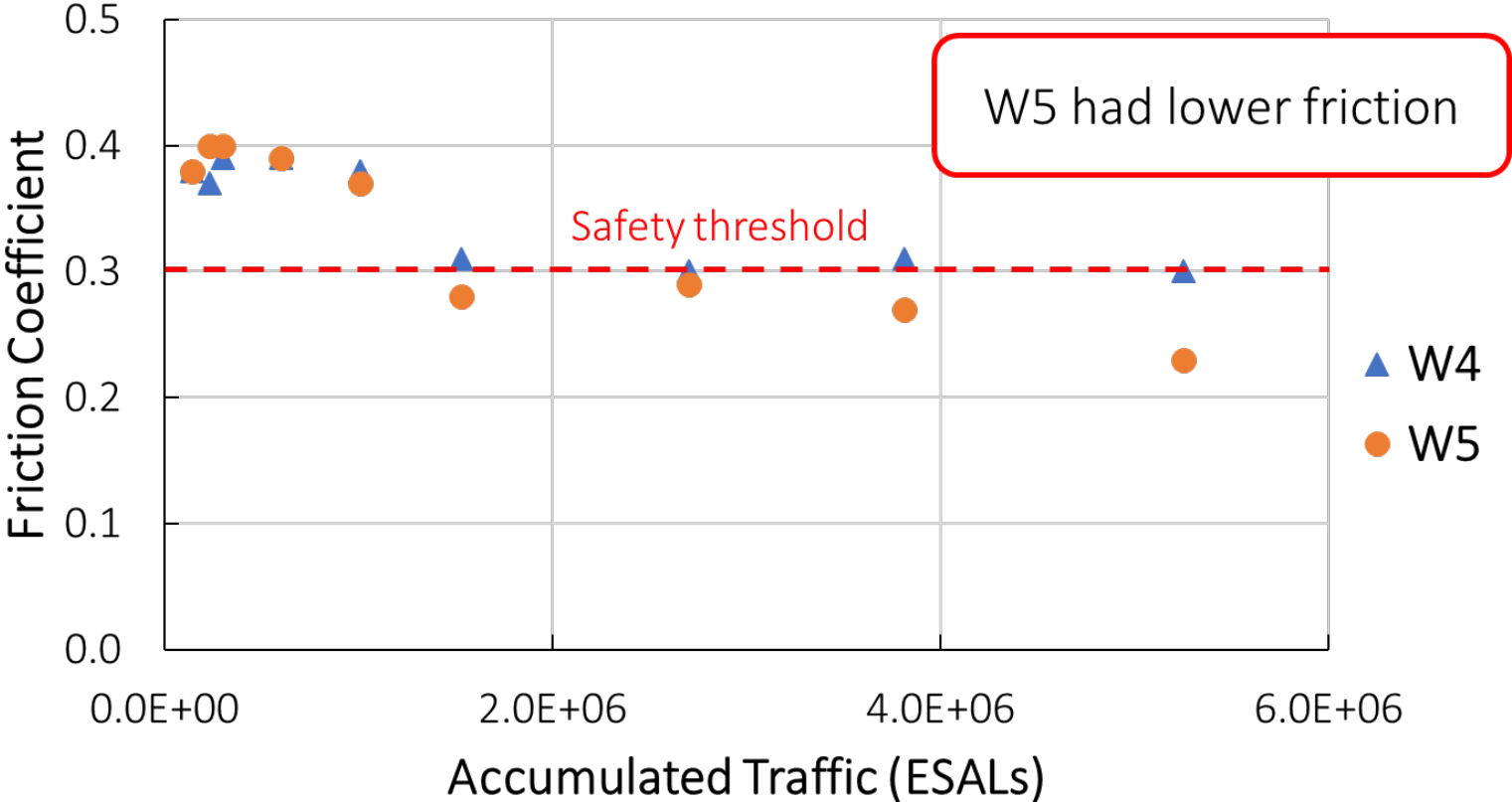
Section ID		W4	W5
Aggregate Blend	Coarse	28% Dol, 12% SS	36% Dol, 4% SS
	Fine	45% Lms, 15% RAP	45% Lms, 15% RAP
Coarse Aggregate Proportion		70% Dol. + 30% SS	90% Dol. + 10% SS
Binder (PG 76-22) ¹		5.6%	5.6%

Note: ¹ 0.5% Evotherm M1 was added to reduce moisture susceptibility of asphalt mixture

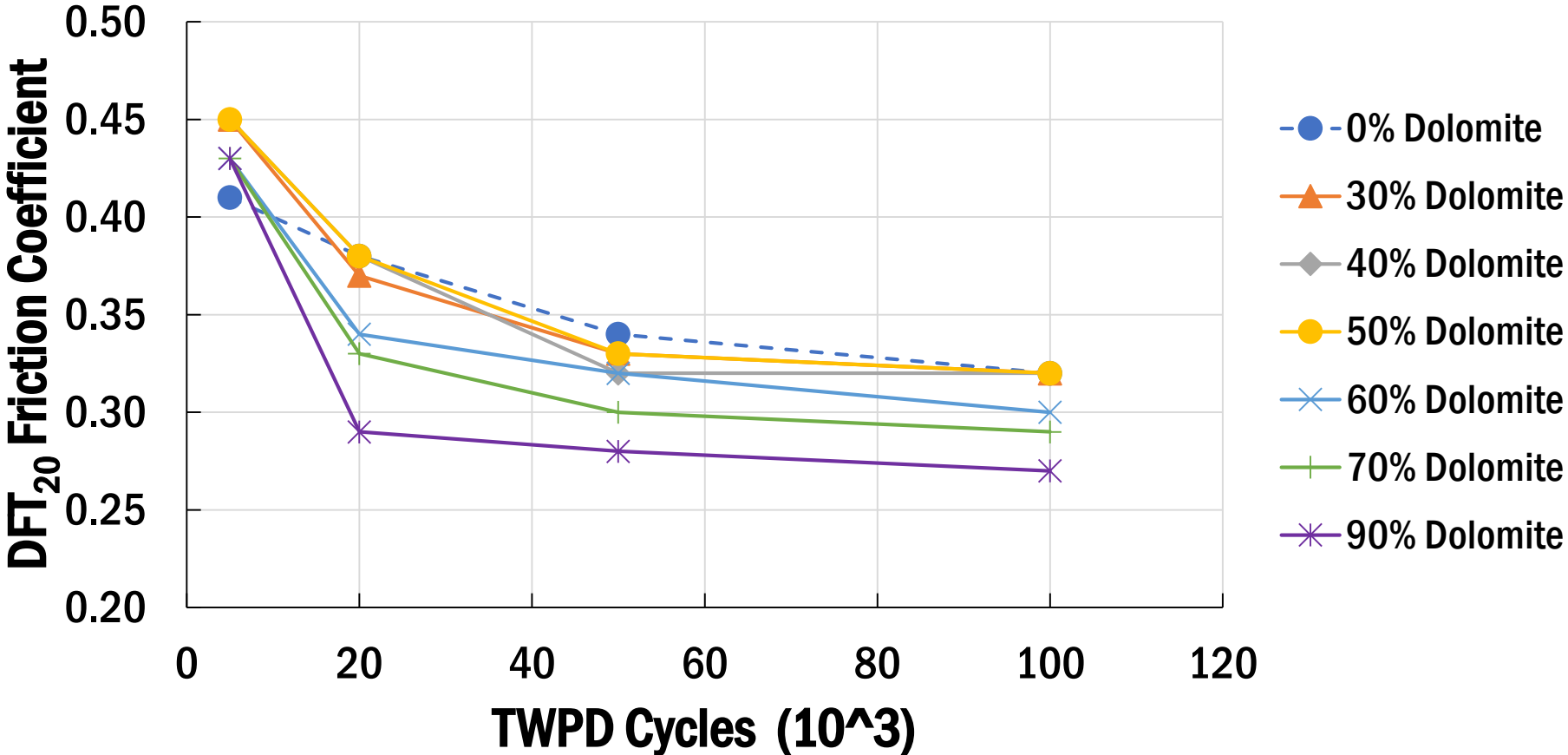
Field Friction Evaluation - LWST



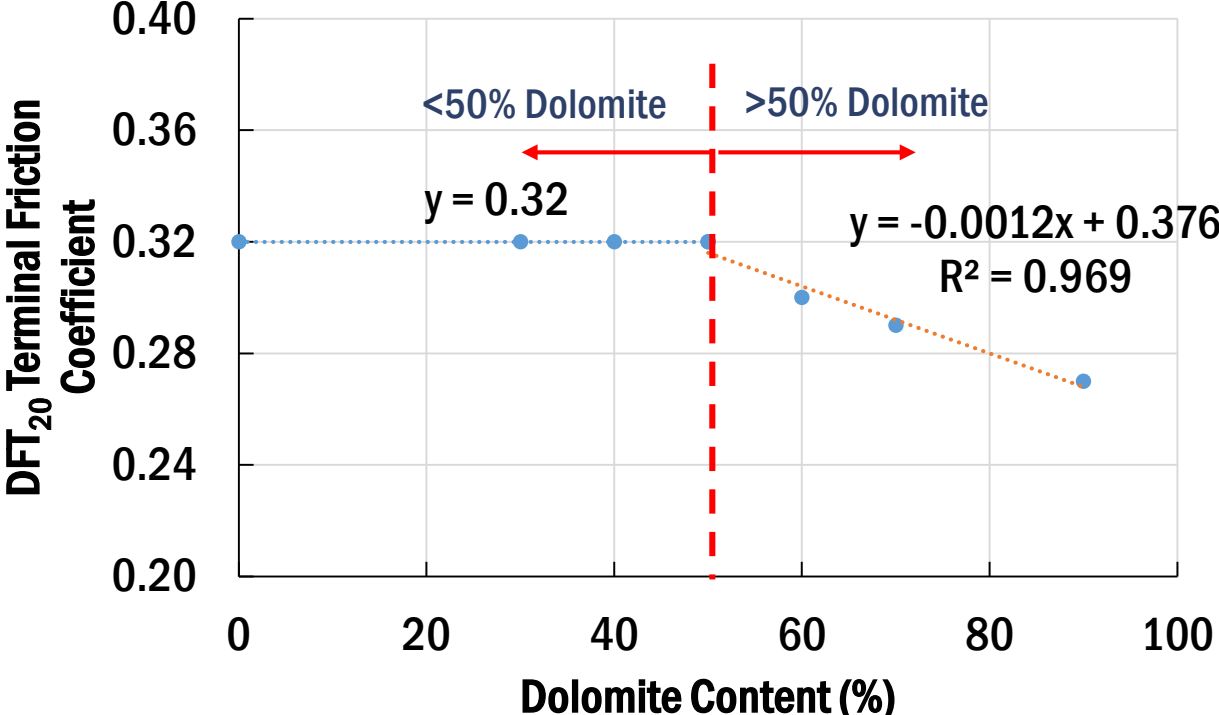
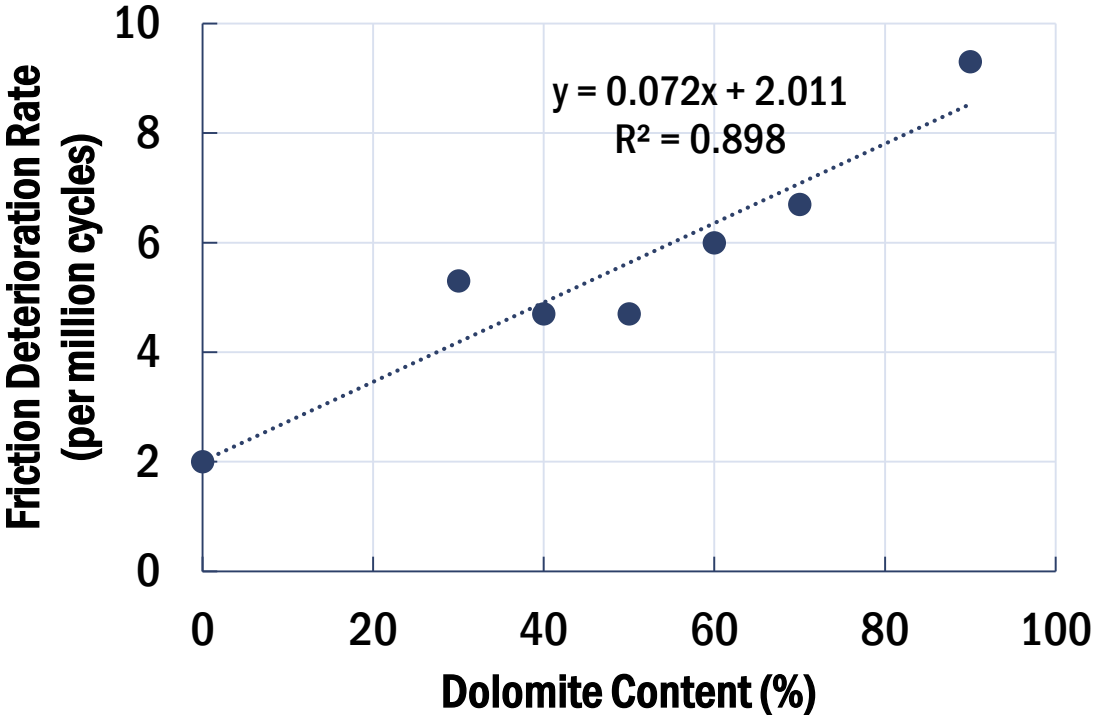
Field Friction Evaluation - DFT



Lab Friction Evaluation



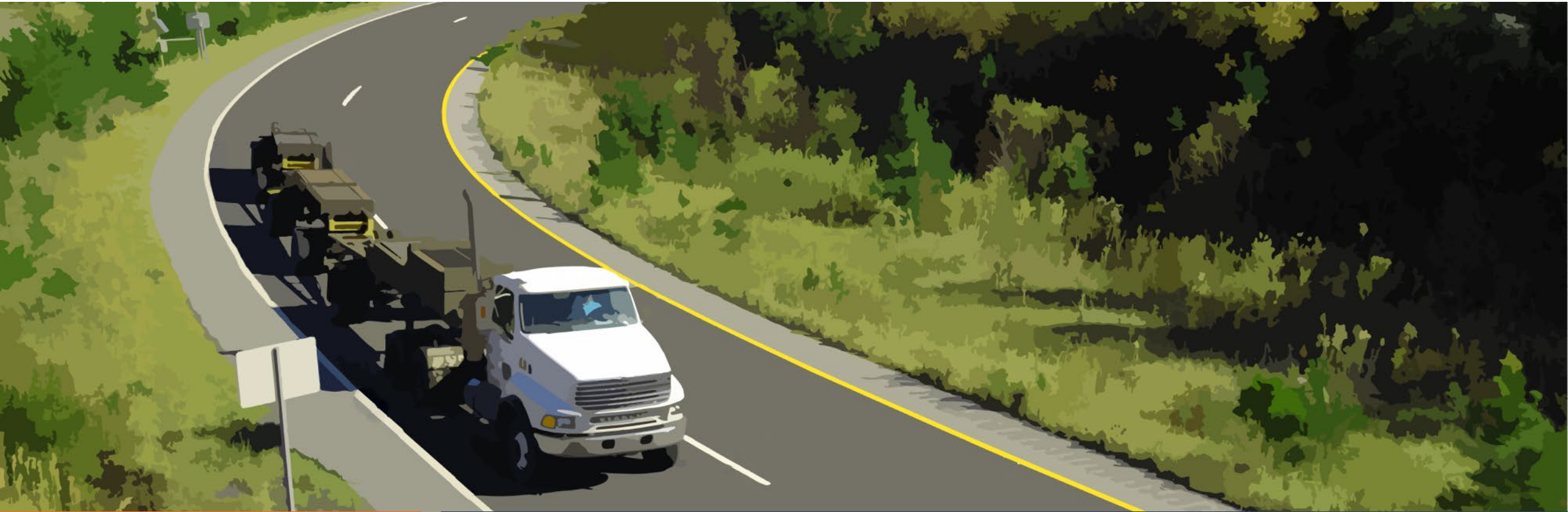
Influence of Dolomite Content



Findings

- ❑ WVD0H asphalt mixtures containing 70% or 90% dolomite aggregates cannot provide adequate long-term friction.
- ❑ Three-wheel polishing device is capable of simulating traffic polishing in the field.
- ❑ Increasing dolomite content accelerates the initial polishing.
- ❑ Terminal friction coefficient dramatically drops if dolomite content is greater than 50%.

Questions and Answers



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