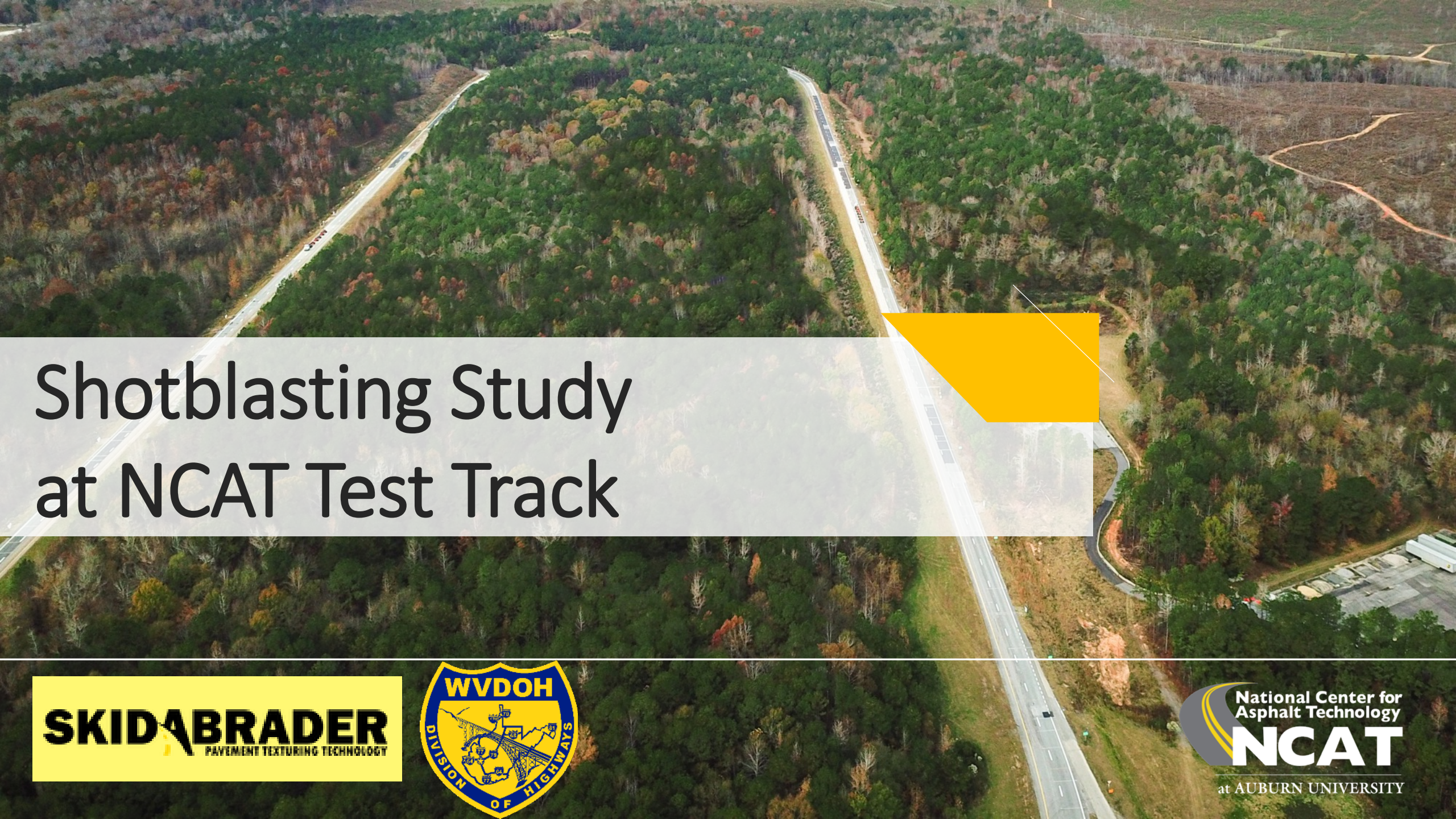


Shotblasting Study at NCAT Test Track

SKIDABRADER PAVEMENT TEXTURING TECHNOLOGY

WVDOH DIVISION OF HIGHWAYS

National Center for Asphalt Technology NCAT at AUBURN UNIVERSITY

Presentation Outline

- Research Background
- Research Objective
- West Virginia Friction Study
- Shotblasting Treatment

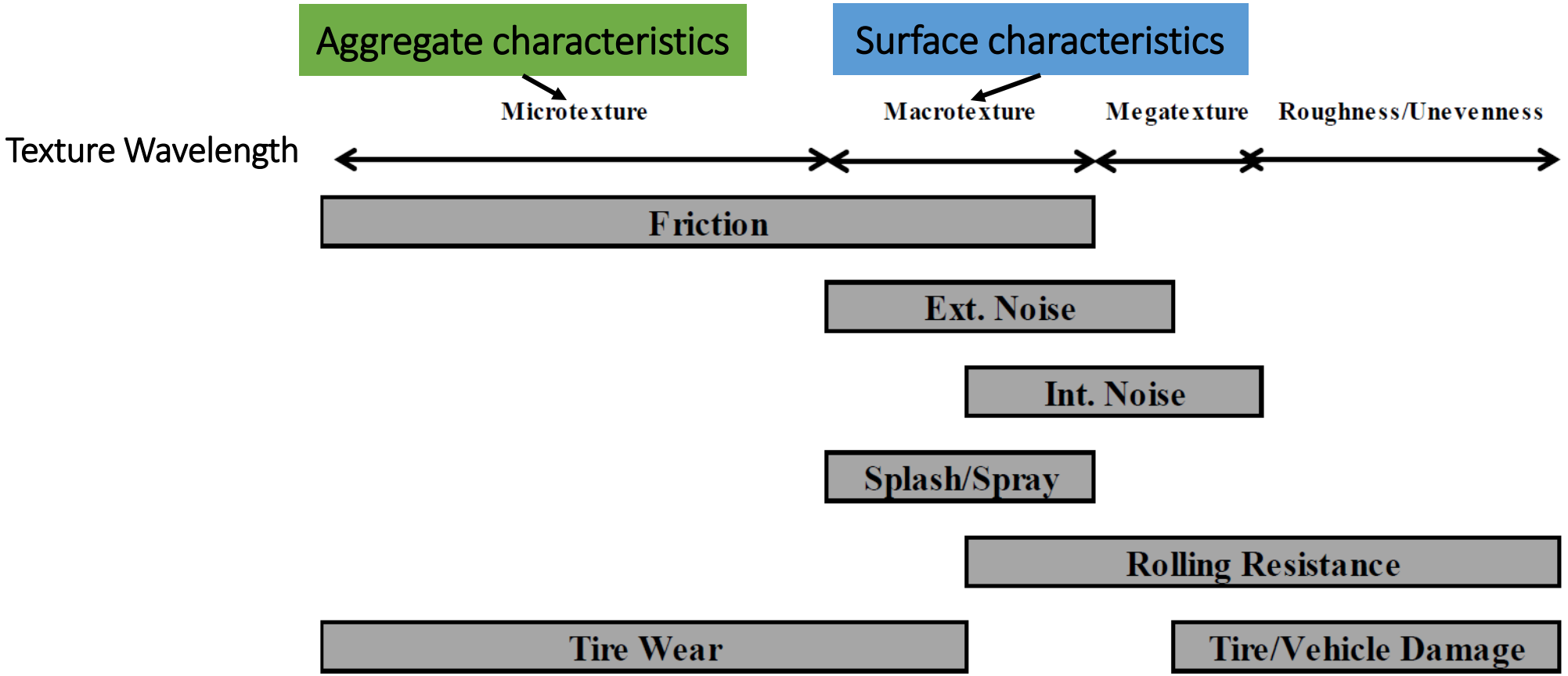
Why Friction is Important

- Car Accident Statistics in 2019
  - Over 37,000 people die
  - 2.35 million are injured
  - 230.6 billion road crash cost
- Pavement Friction and Road Accident Rates

Pavement Friction	Accident Rates (per million vehicle km)
<0.15	0.80
0.15-0.24	0.55
0.25-0.34	0.25
0.35-0.44	0.2

Source: Wallman and Astrom (2001)

Key Pavement Characteristics



(Henry, 2000)

NCAT Friction Test Devices

- Locked-Wheel Skid Trailer (ALDOT)
  - Ribbed tire, 40 mph
  - Monthly test at Test Track
- Three-Wheel Polishing Device
  - Polishing lab-compacted slabs
- Dynamic Friction Tester
  - Lab-compacted slabs
  - Test Track

Locked-wheel skid trailer (LWST)

Three-wheel Polishing Device

Dynamic Friction Tester

Research Objective

- Evaluate the influence of shotblasting treatment on friction performance of asphalt pavements.

West Virginia Friction Study

AGGREGATE SELECTION

Spec. 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)…

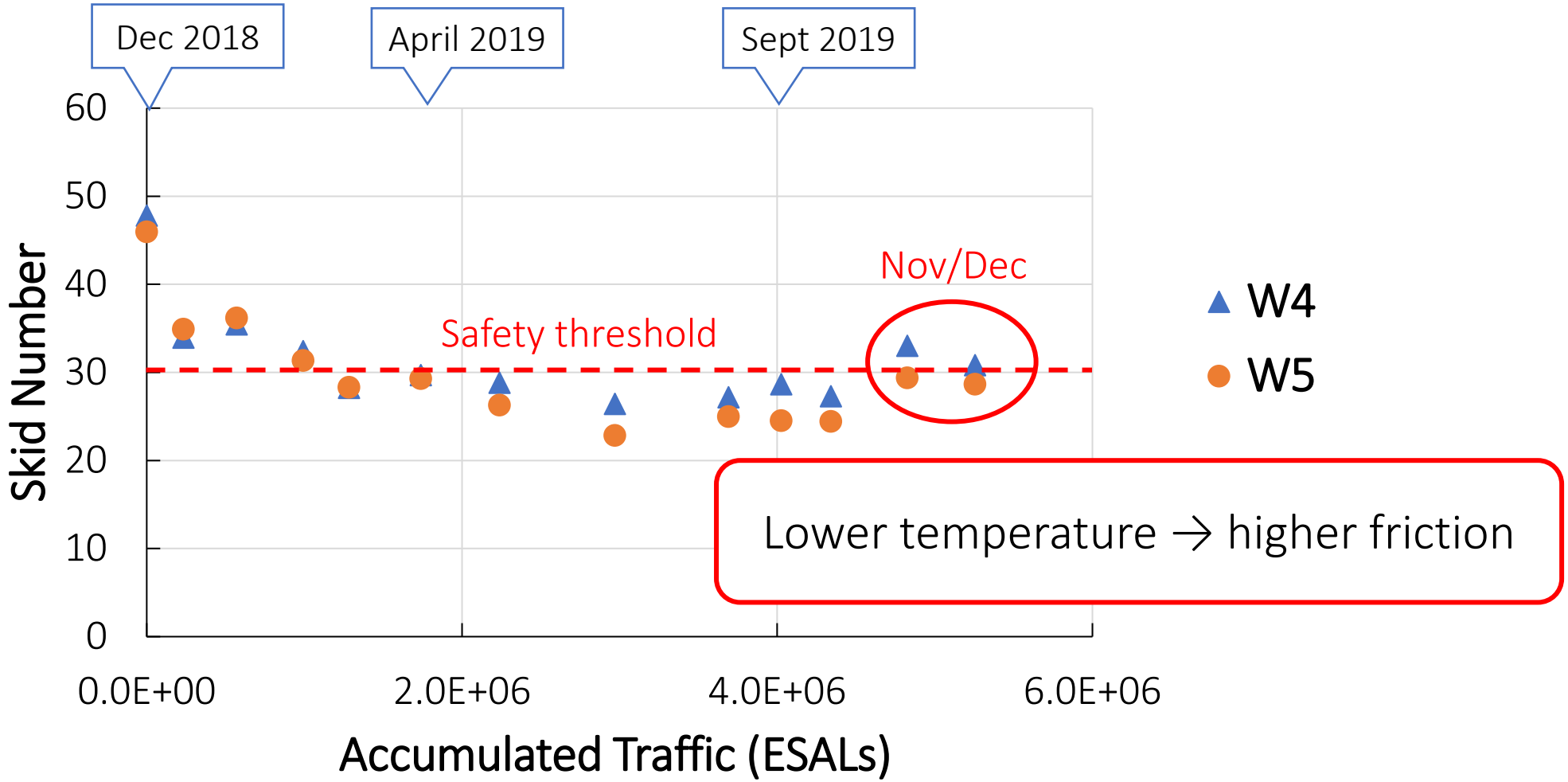
- W4- 70% dolomite
- W5- 90% dolomite

Mix Design

	W4	W5
Aggregate Blend	28% Dol, 12% SS, 45% Lms, 15% RAP	36% Dol, 4% SS, 45% Lms, 15% RAP
CA (+No 4) 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



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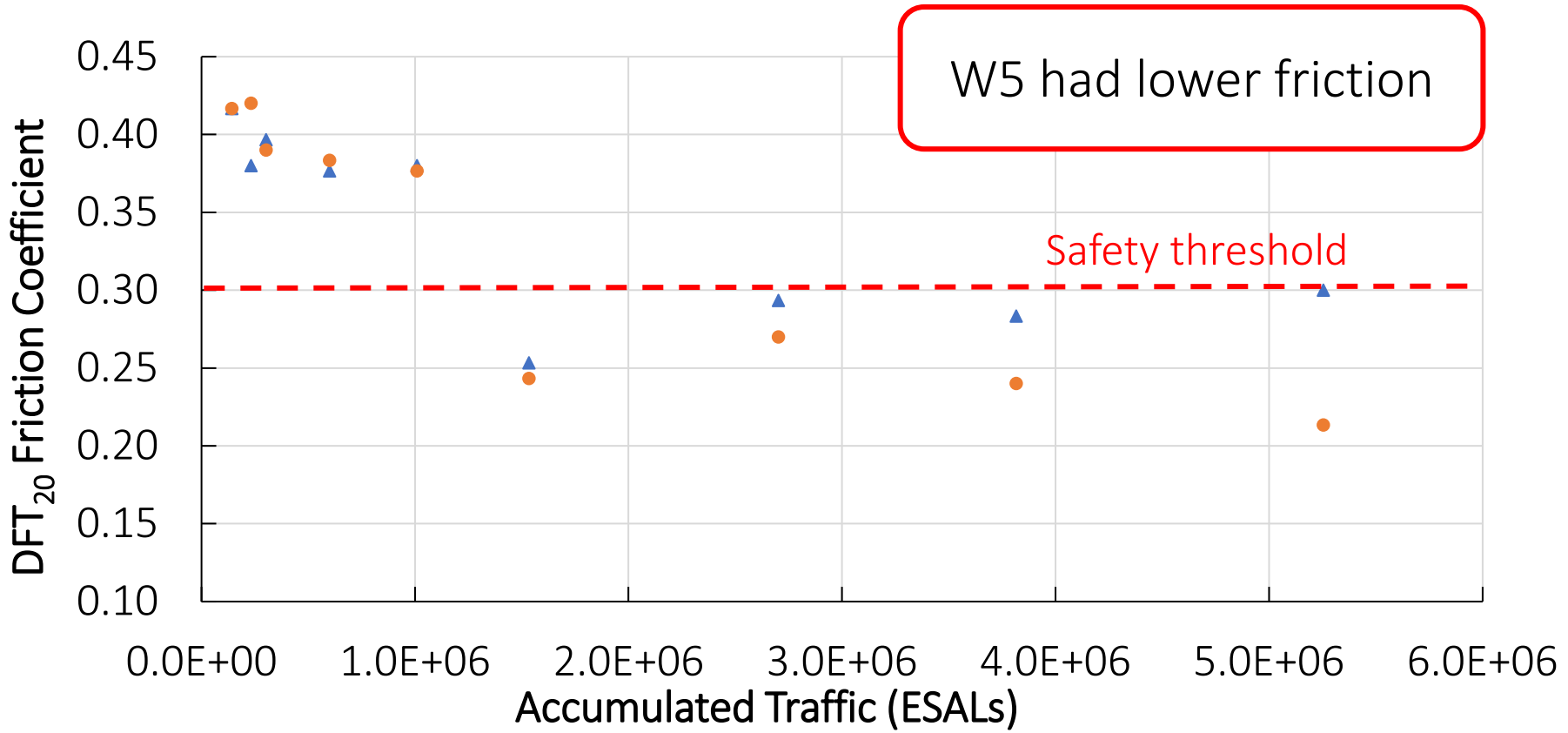
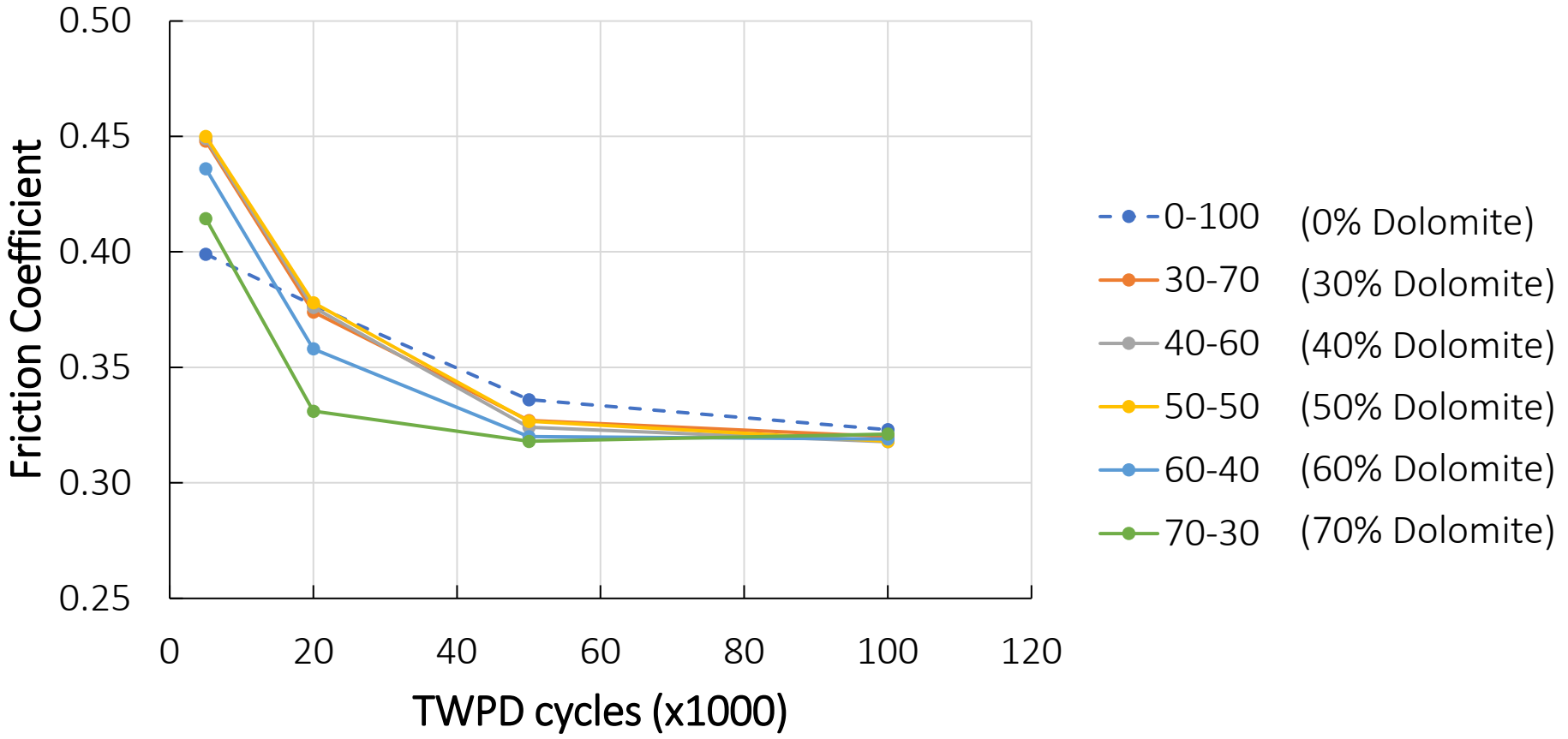
Field Friction Evaluation - DFT



Lab Friction Evaluation



Shotblasting Treatment

Shotblasting at NCAT Test Track

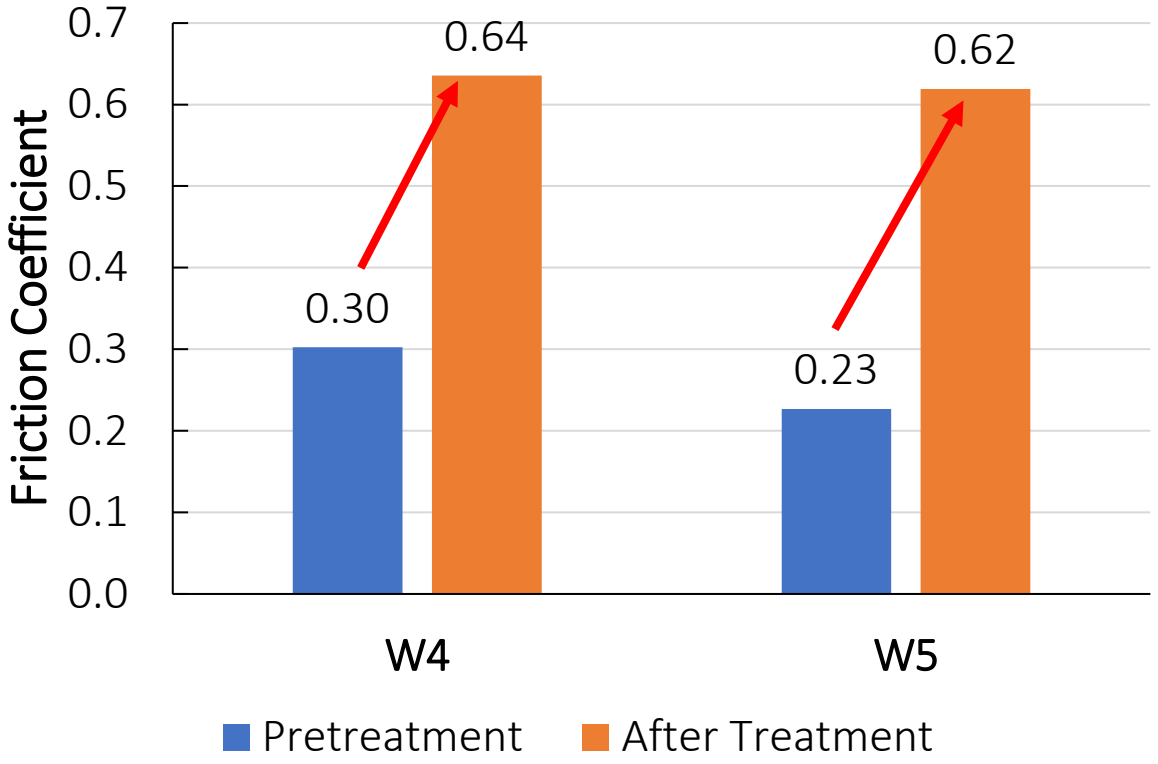
Shotblasting at W4 & W5

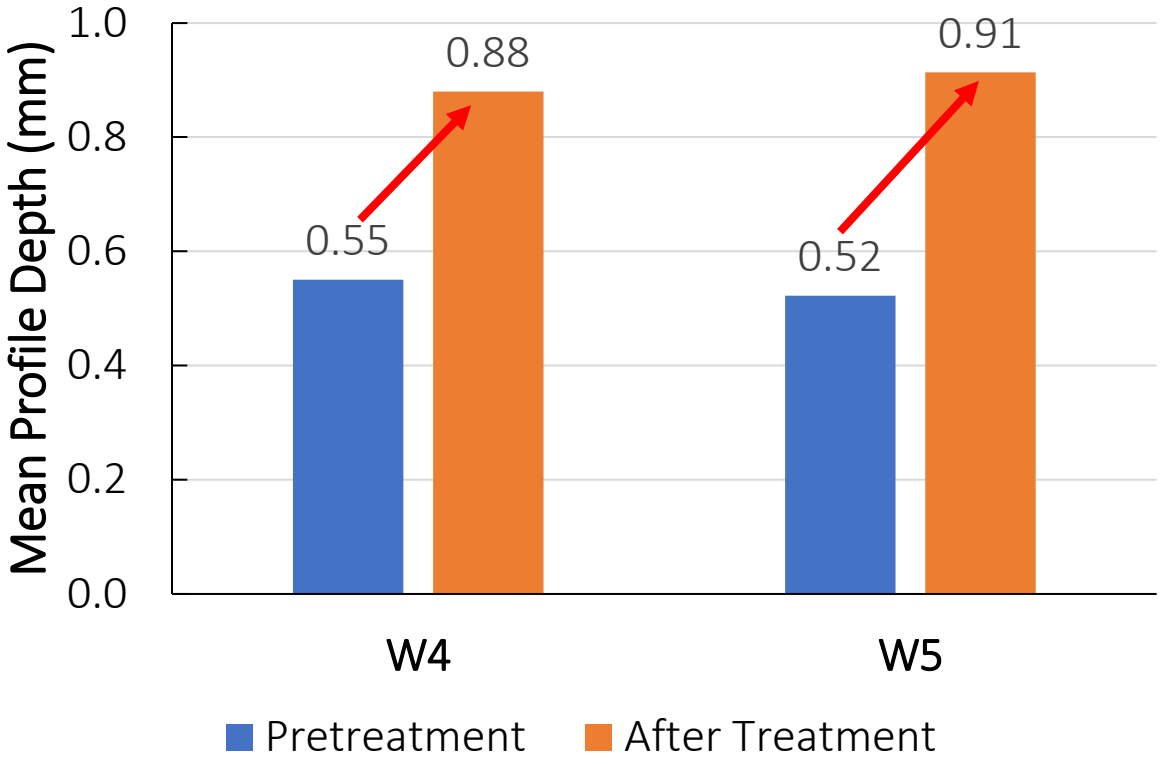
Shot size

Shot blasted surface

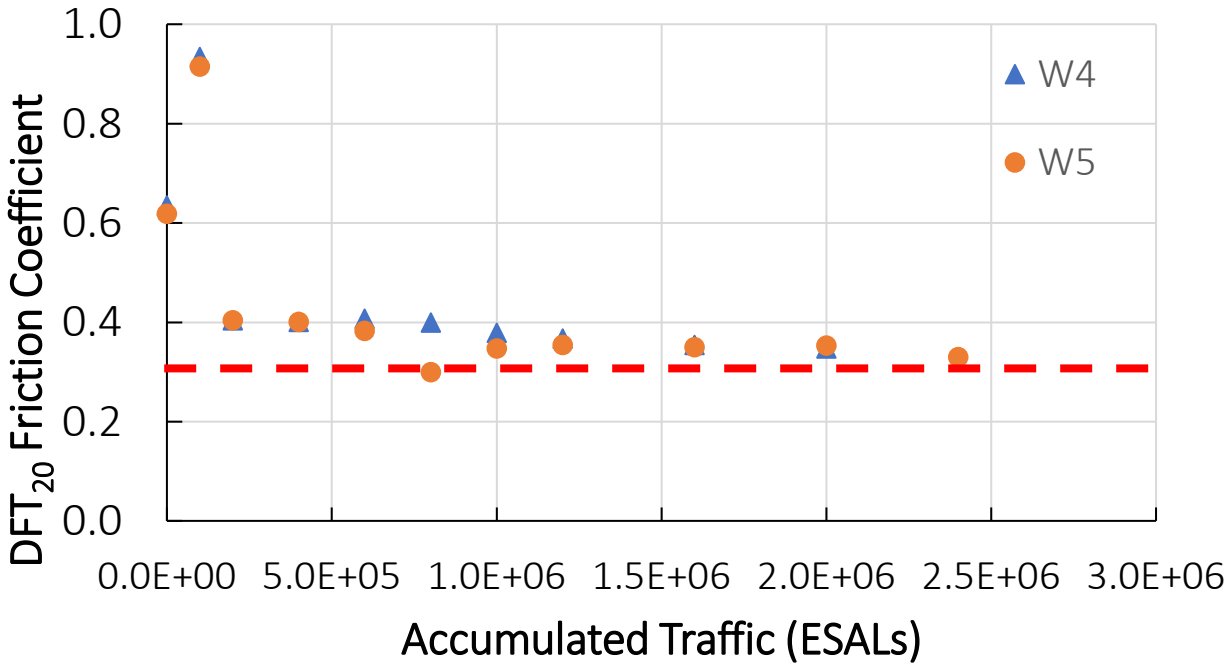
Surface texture

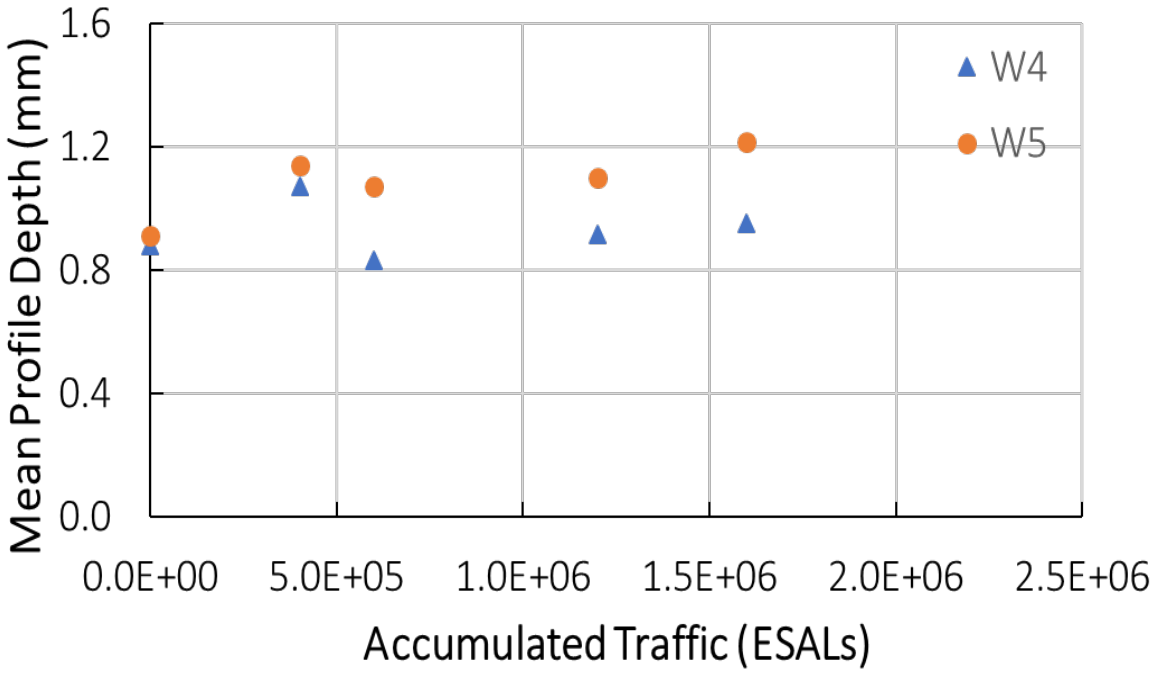
Before and After Shotblasting





Long-Term Friction After Shotblasting





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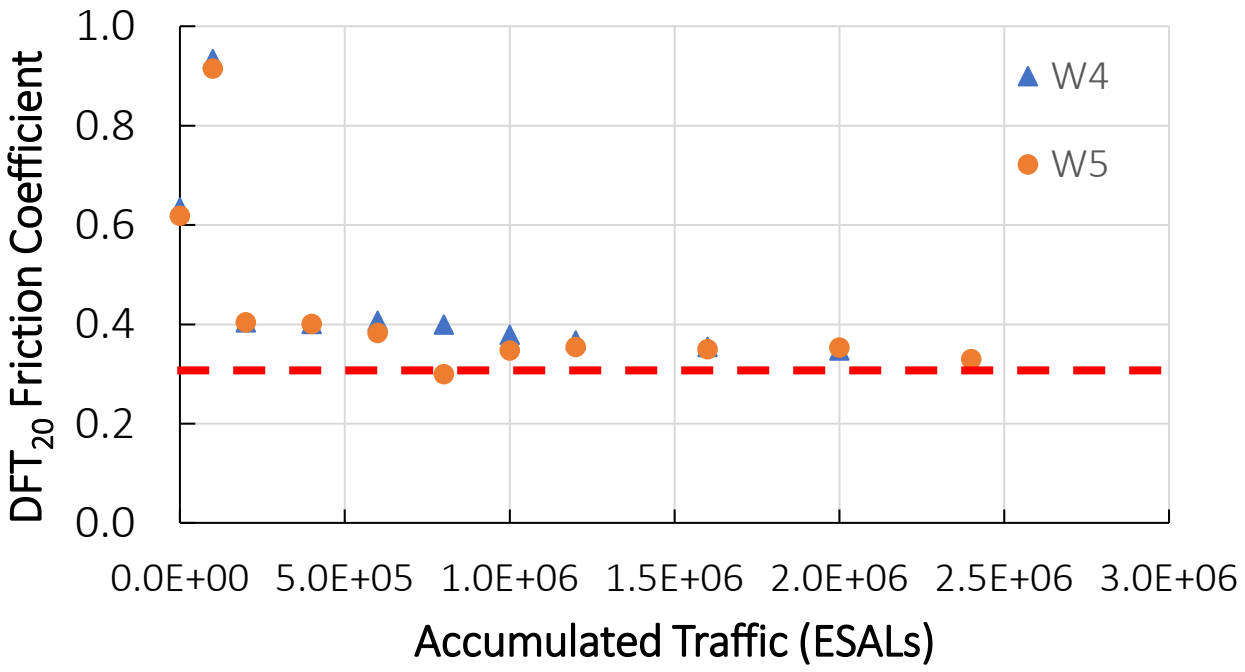

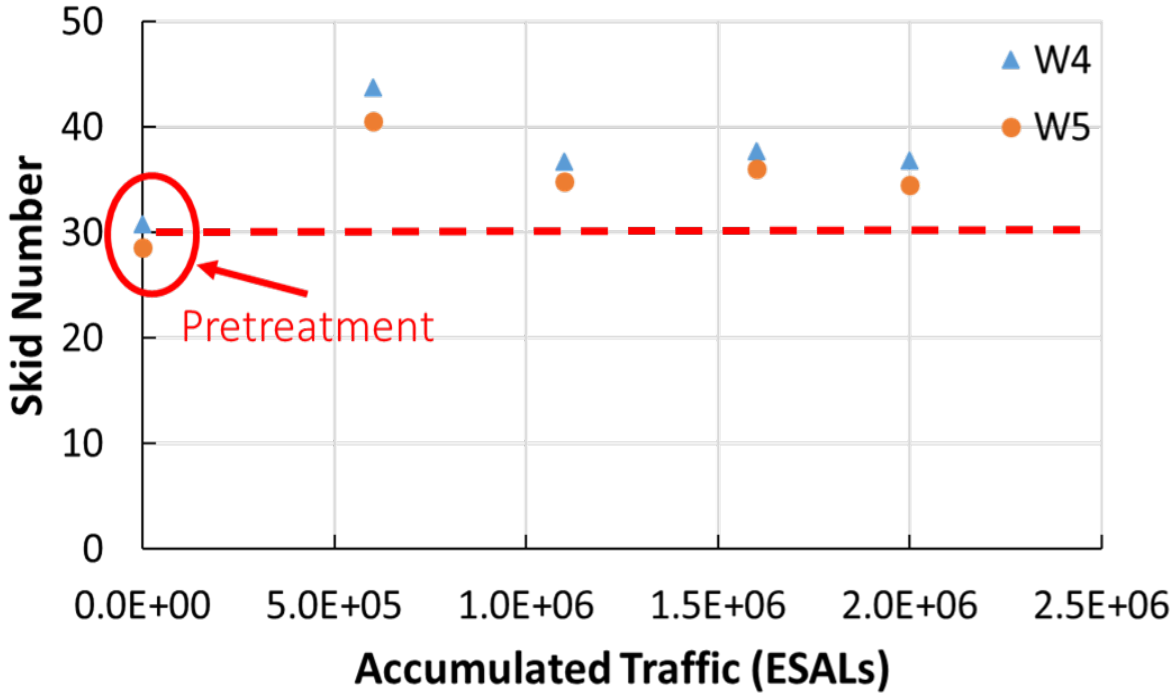

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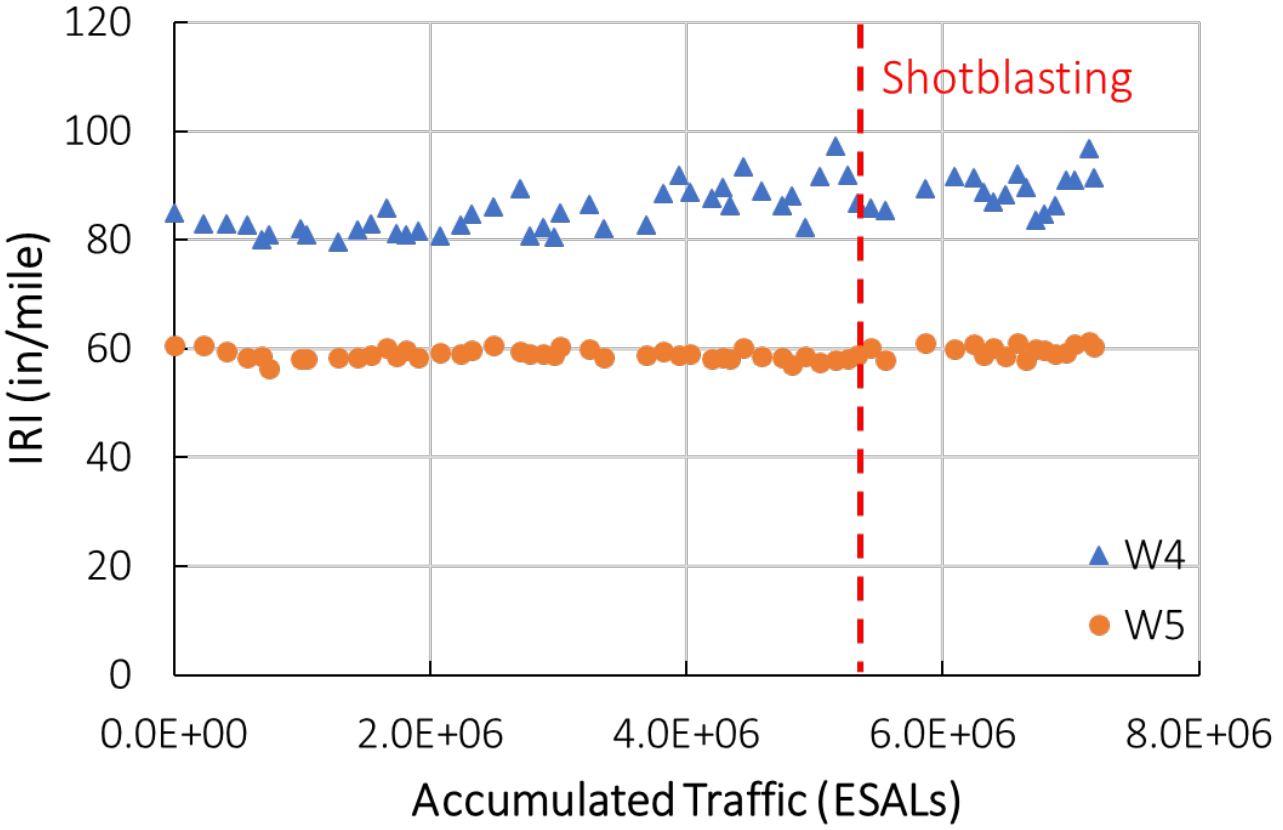
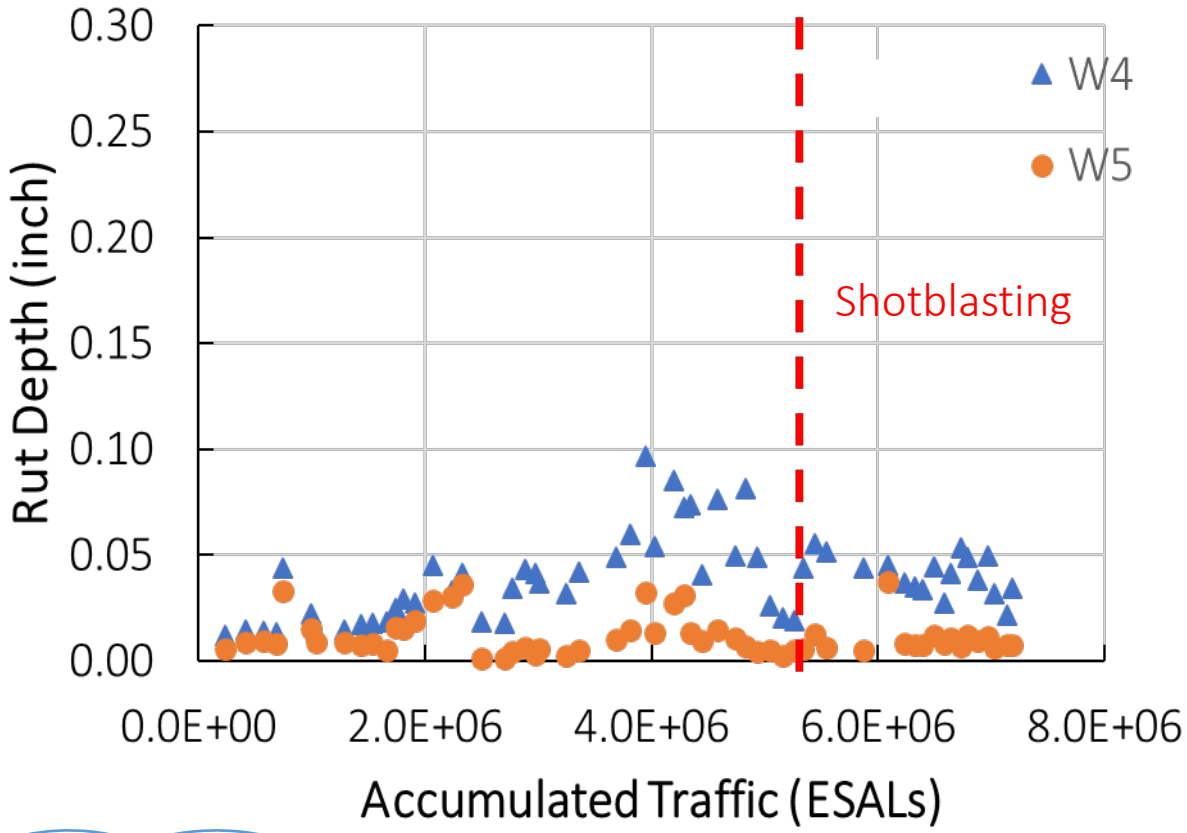
Other Field Performance





No Cracking

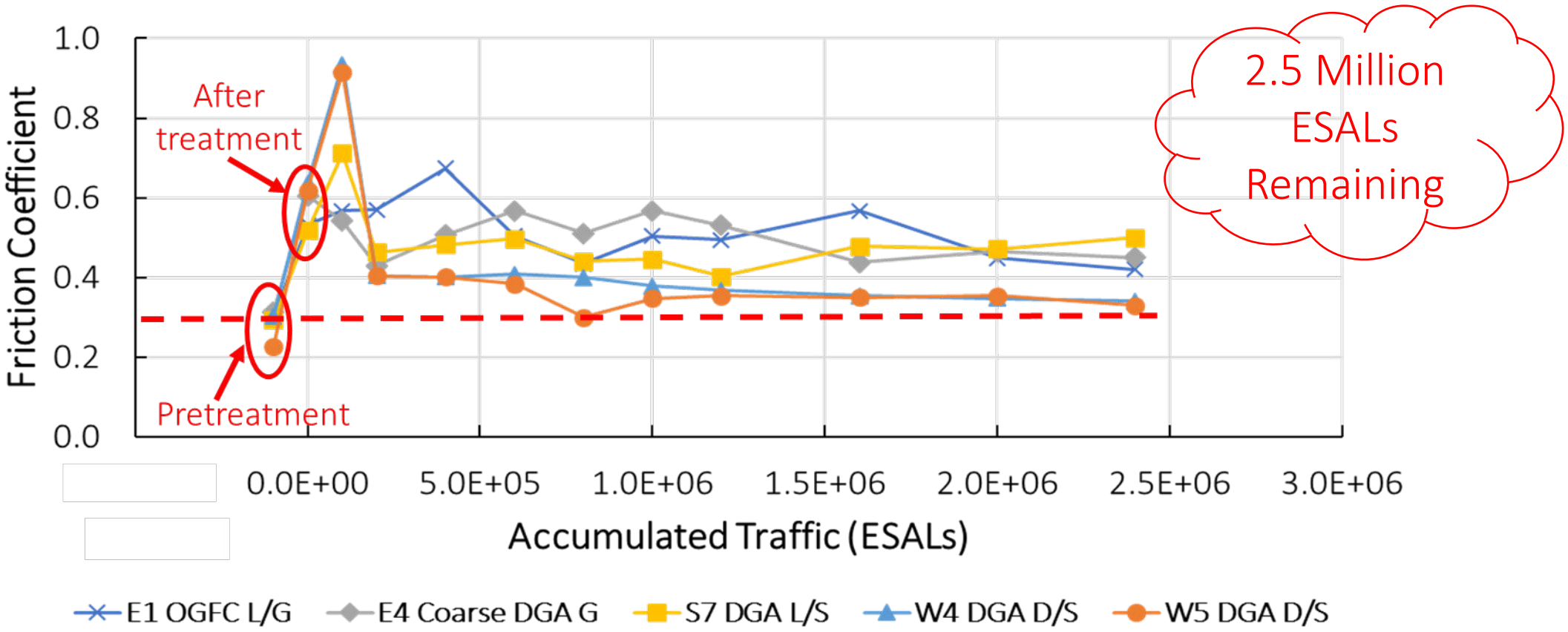
Shotblasting Treated Sections

Section No.	Description	Construction Year
E1	OGFC, Limestone/Granite	2012
E4	Coarse DGA, Granite	2000
S7	DGA, Limestone/Sand/RAP	2015
W4	DGA, 70% Dolomite + 30% Sandstone	2018
W5	DGA, 90% Dolomite + 10% Sandstone	2018

Macrotexture Results

Section No.	MPD (mm)						
	Pretreatment	After treatment	4-week	6-week	12-week	16-week	24-week
E1	2.12	2.75					
E4	1.29	1.33					
S7	0.95	1.38					
W4	0.55	0.88					
W5	0.52	0.91					

Long-Term Friction Results



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Preliminary Conclusions

- WVDOH asphalt mixtures containing 70% or 90% dolomite and sandstone coarse aggregates cannot provide adequate long-term friction.
- After 2.5 million ESALs of trafficking, asphalt pavements with shotblasting treatment still have satisfactory friction.
- Shotblasting treatment does not have detrimental effects on pavement performance.

Future Plan

- Continue monitoring friction till the end of this cycle
- Include shotblasting study into Phase VII NCAT Test Track Final Report
- Prepare a peer-review journal paper
- Submit research needs to state DOTs

Budget Review

- Total Budget: $13,220
- Paid: $6,610 (Invoice on 02/18/2020)

Thank You

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