National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY

Structural Contribution Of Recycled Sections On Lee Road 159 And US 280

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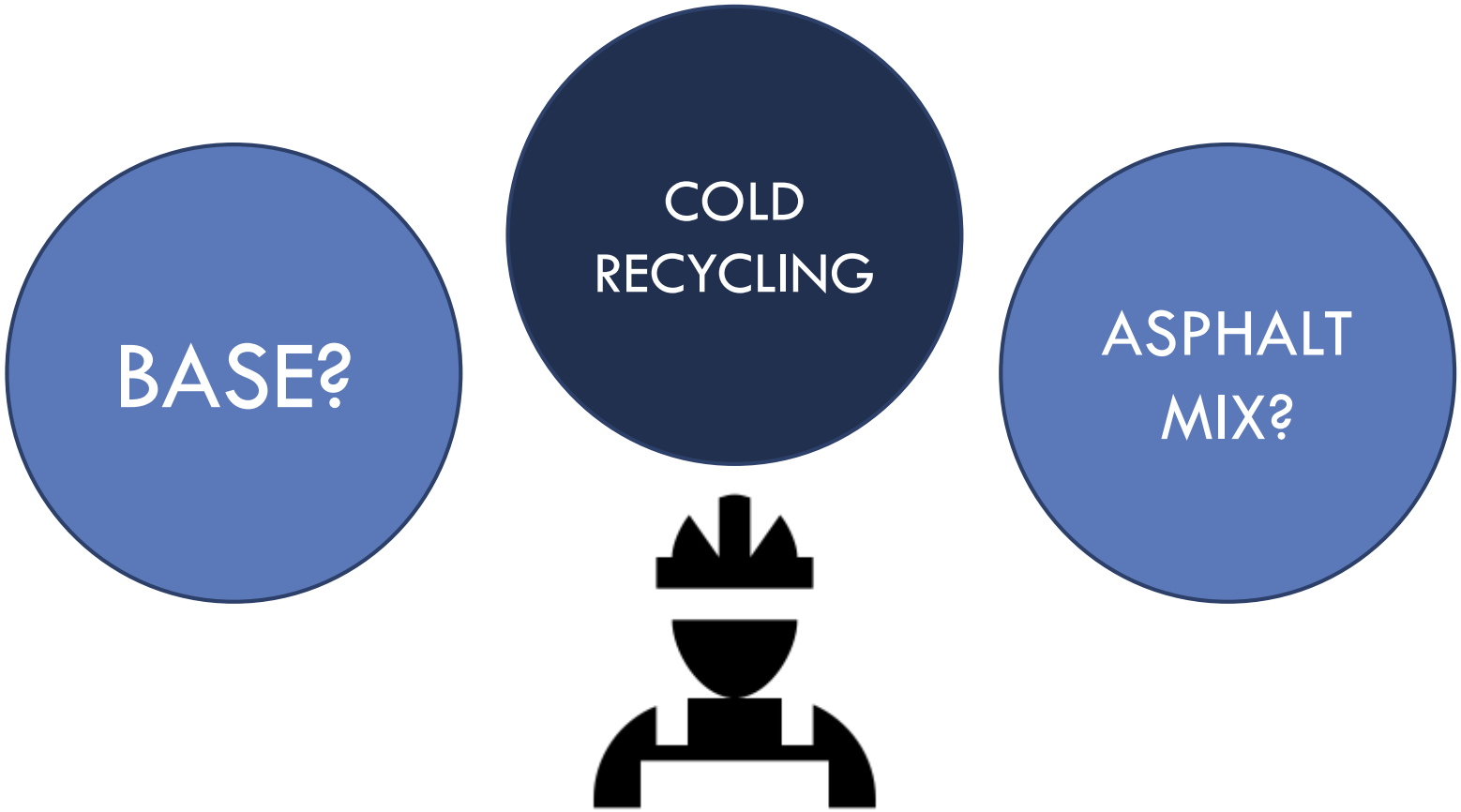
SEVENTH
RESEARCH CYCLE

NCAT TEST TRACK CONFERENCE

Background

- Cold recycling (CR) is gaining popularity among agencies
  - Environmentally friendly
  - Potential cost savings
  - Good performance
- Used for rehabilitation or even with preservation focus

How Do We Incorporate CR into Pavement Design?



Test Sections

- Southern PG Study sections include different CR options

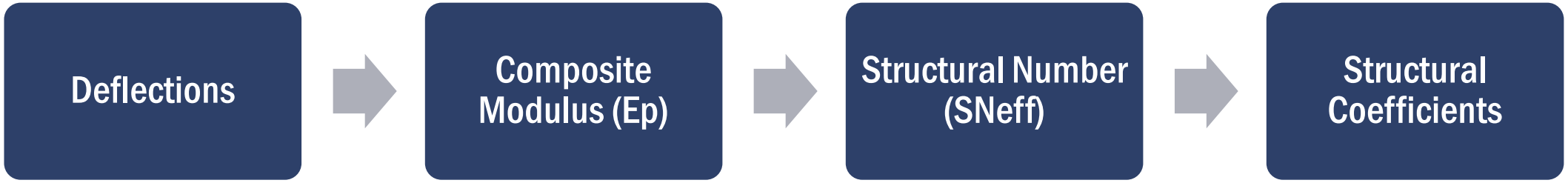
US 280	CCPR – FOAM	CCPR – EMULSION
	CIR – FOAM	CIR – EMULSION
LR 159	CCPR - FOAM	

All removed part of existing pavement and replaced with 4” of CR + 1” thinlay

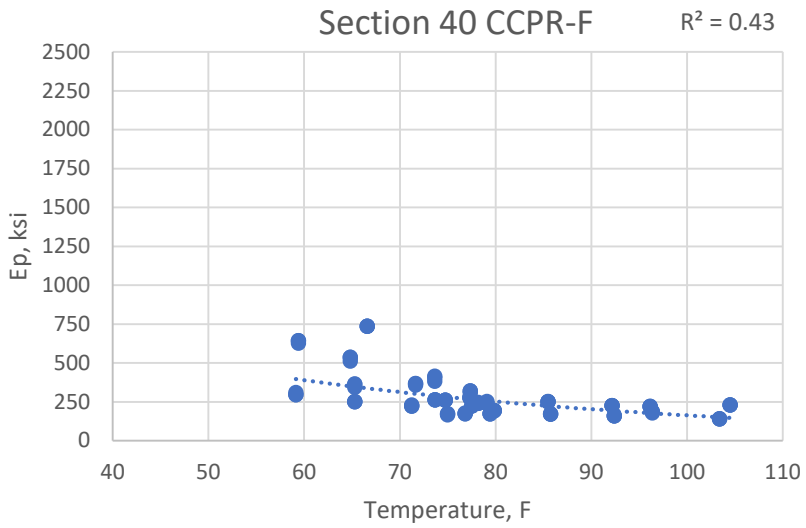
Removed existing pavement and replaced with 6” of CR + ¾” thinlay

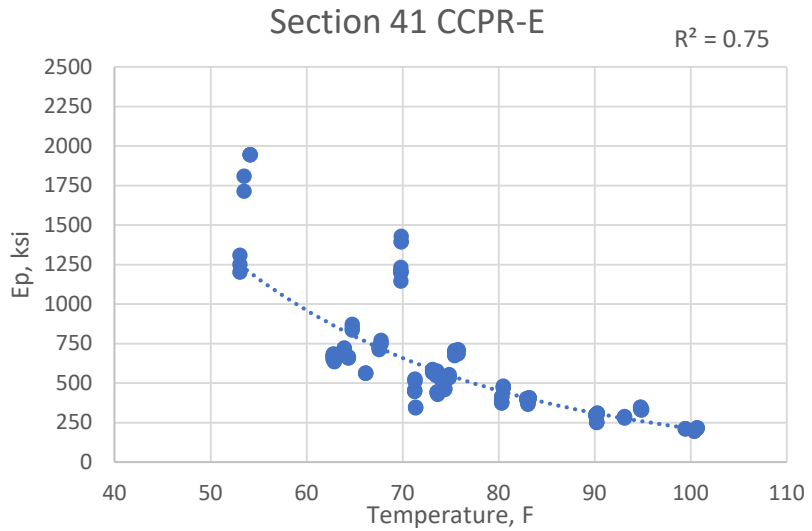
FWD Testing

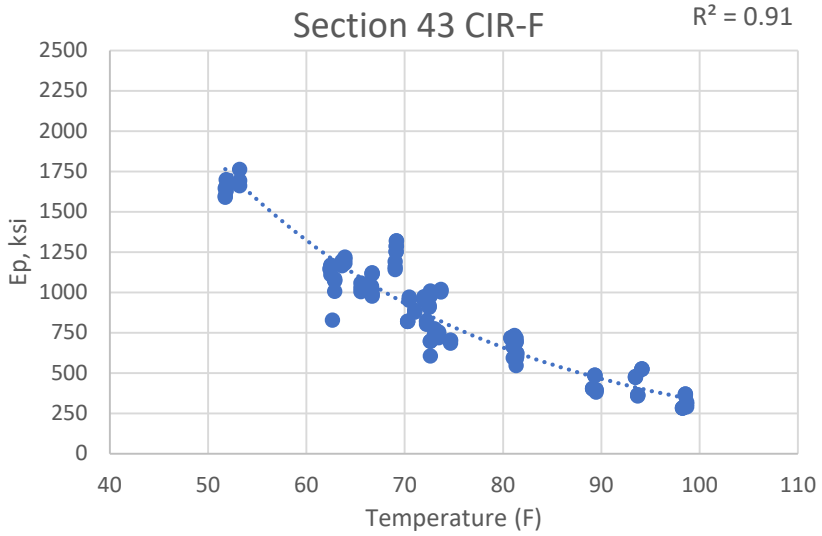
- Performed at 3 random locations in each section
- Monthly / Quarterly

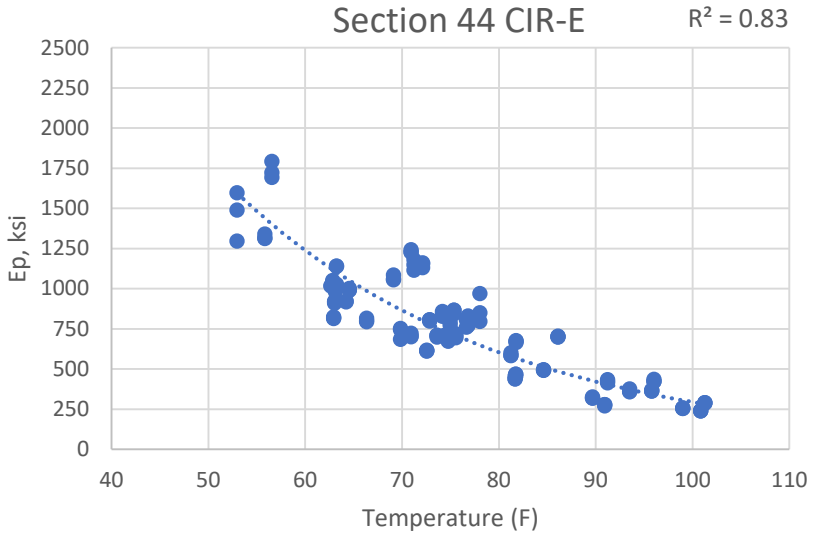


Composite Modulus – US 280





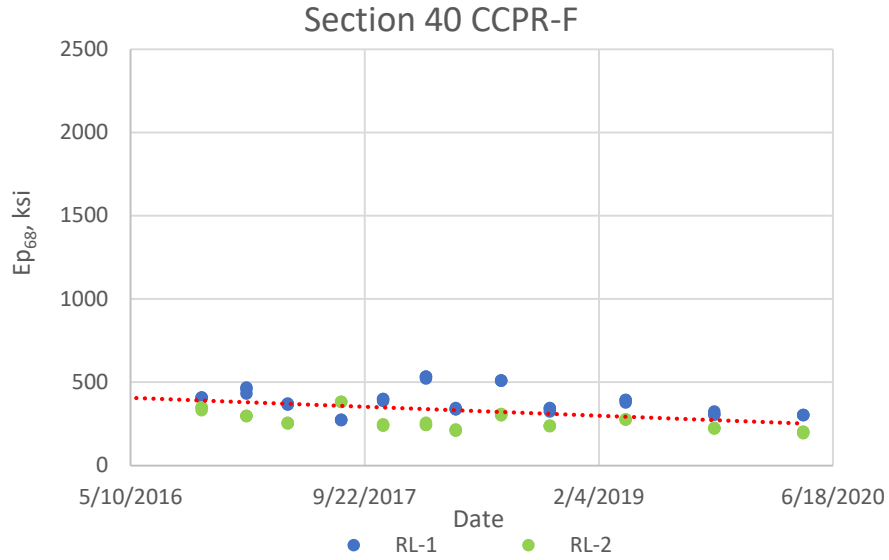


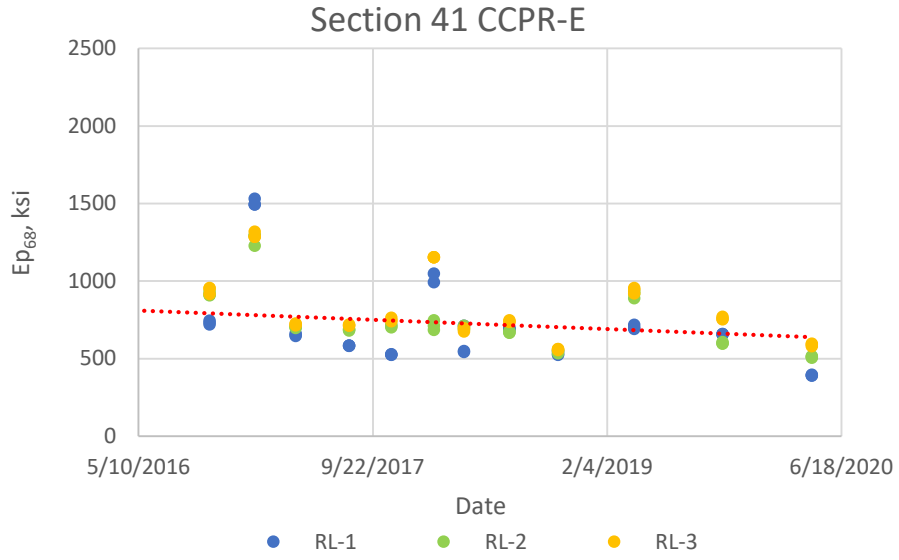


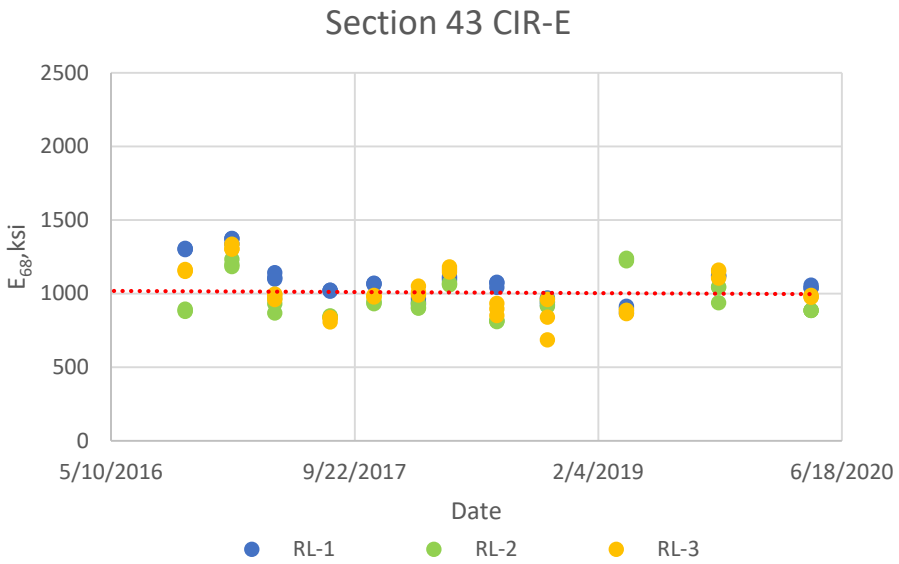
Used ELMOD 6 for backcalculation

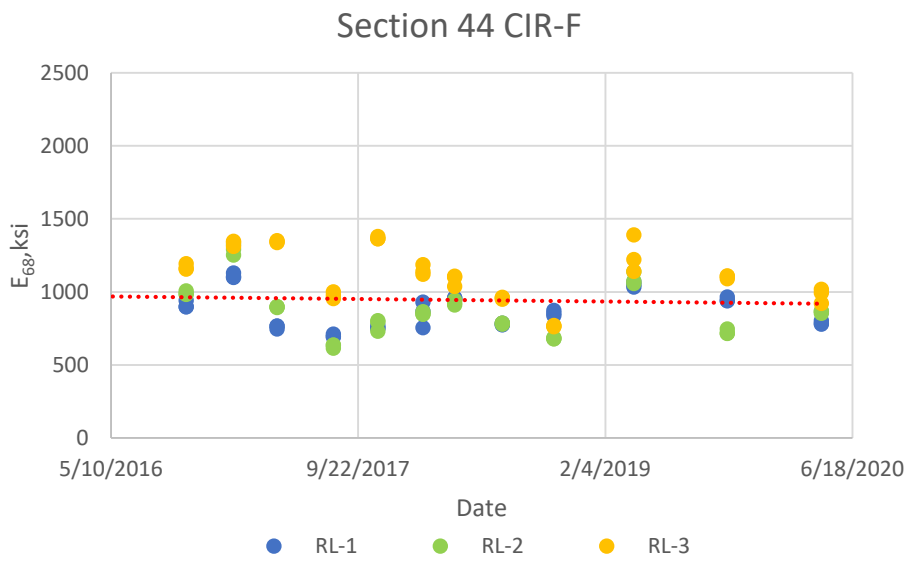
Combined all bituminous materials into one layer

Composite Modulus @ 68F – US 280

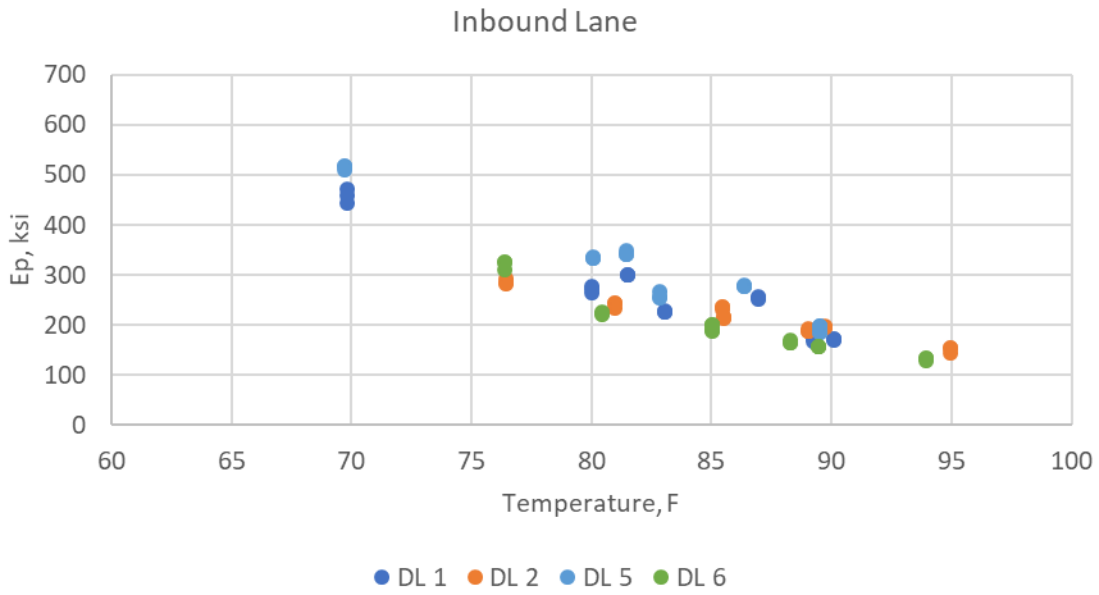


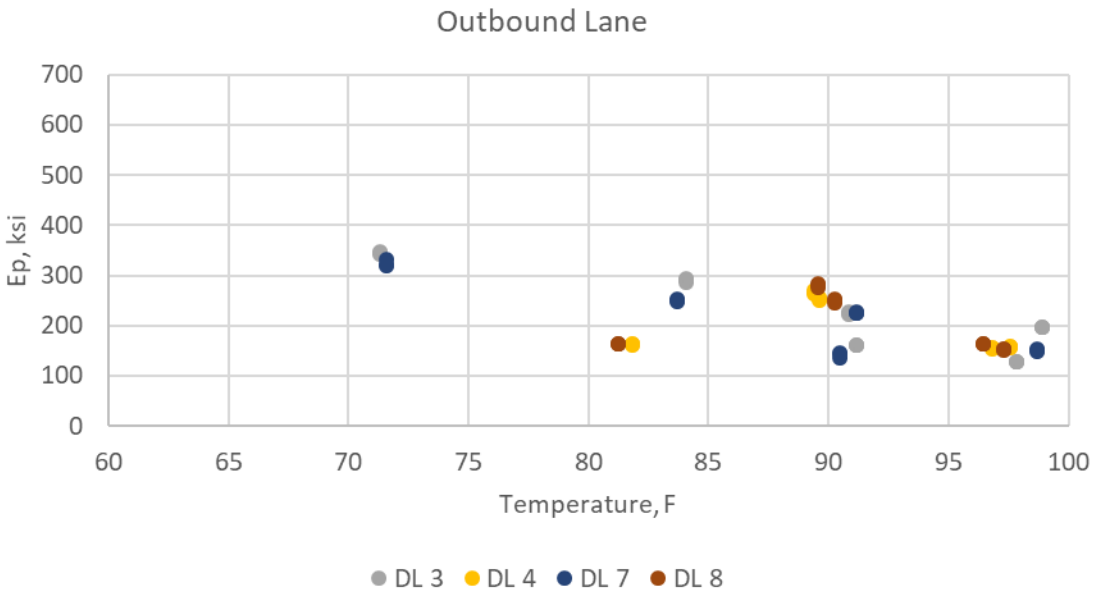




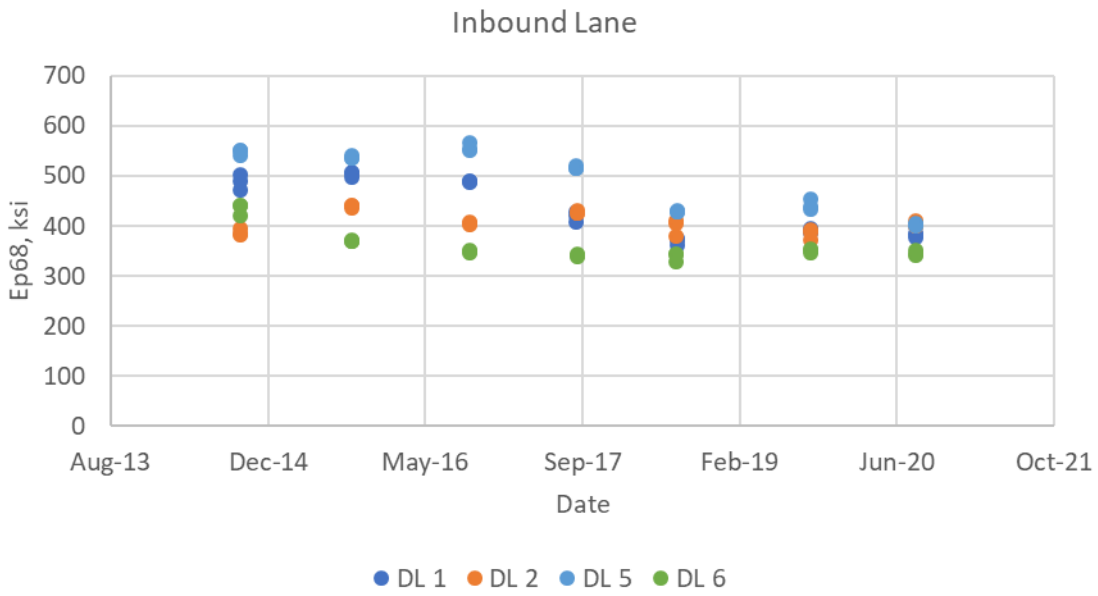


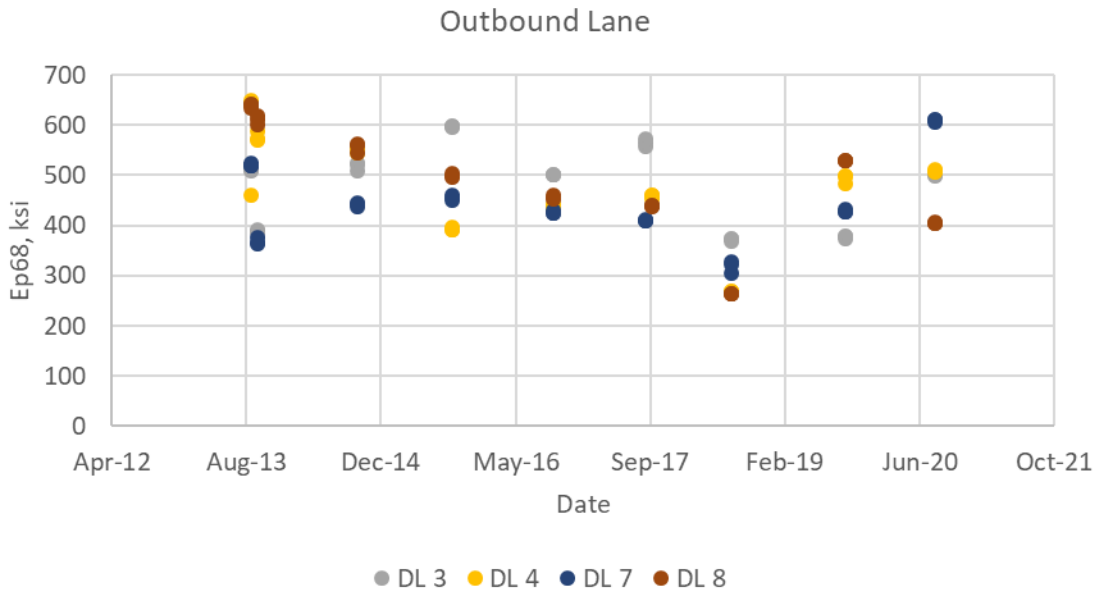
Composite Modulus – Lee Road 159





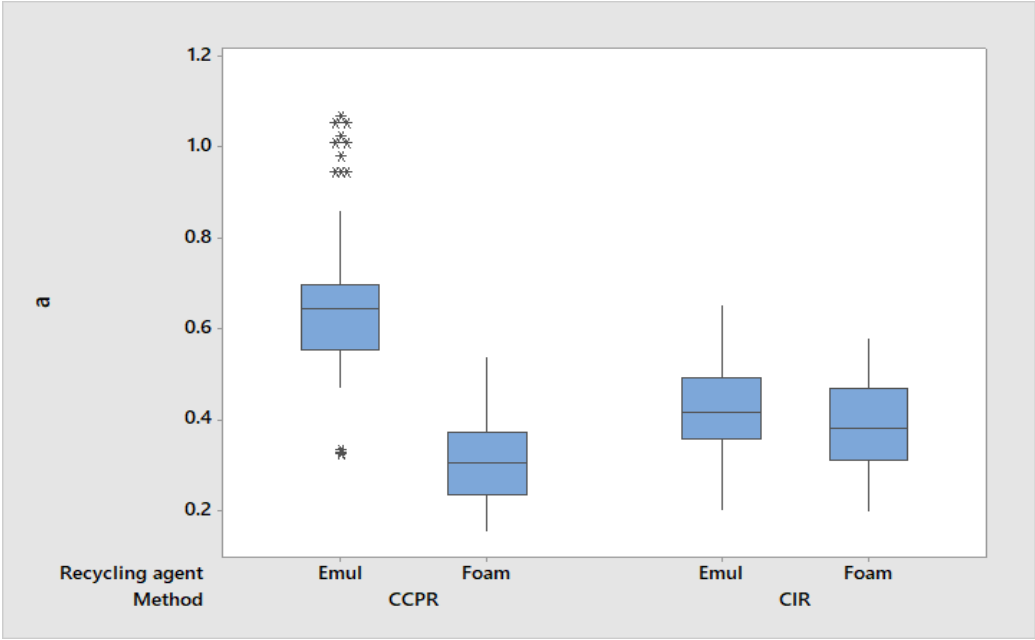
Composite Modulus @ 68F – Lee Road 159





Structural Coefficients – US 280

Section	Method	Recycling agent	N	Average	Std. Dev.
U40	CCPR	Foam	84	0.31	0.092
U41	CCPR	Emulsion	125	0.66	0.154
U43	CIR	Emulsion	126	0.43	0.092
U44	CIR	Foam	126	0.38	0.103



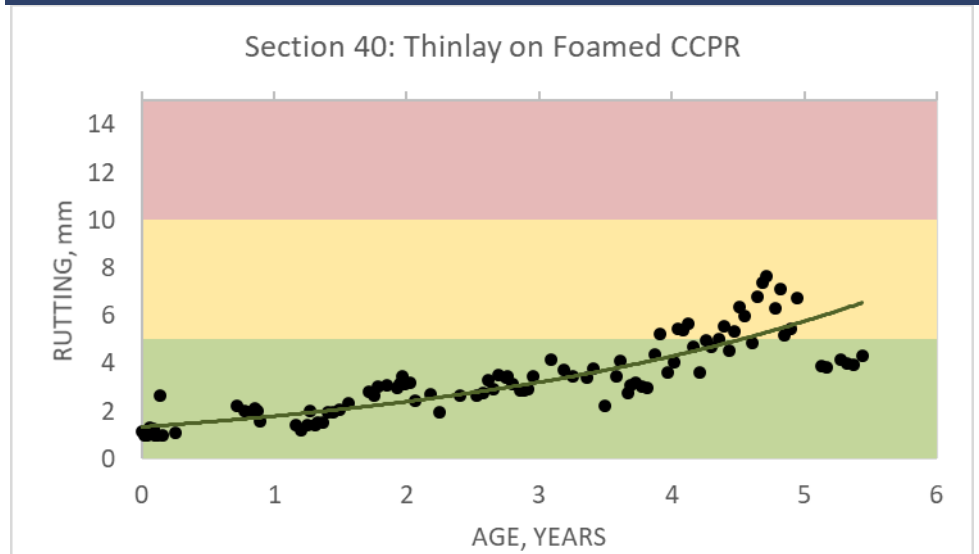
Field Performance – US 280

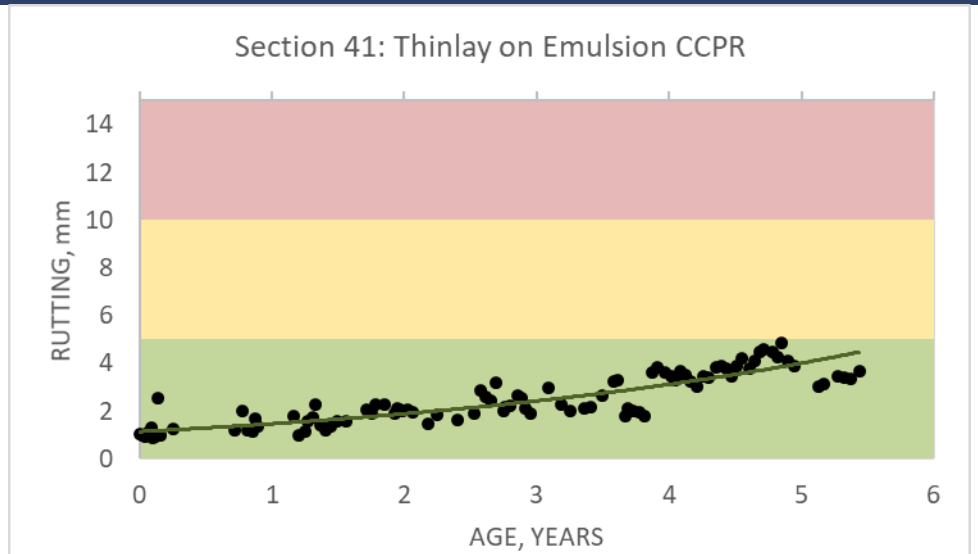
Section	Description	Rutting (mm)	IRI (in/mi)	Cracking (%)
U40	Foamed CCPR	4.3	86.1	8.2
U41	Emulsion CCPR	3.6	92.9	2.2
U43	Emulsion CIR	4.5	98.7	2.0
U44	Foamed CIR	4.4	66.3	1.0

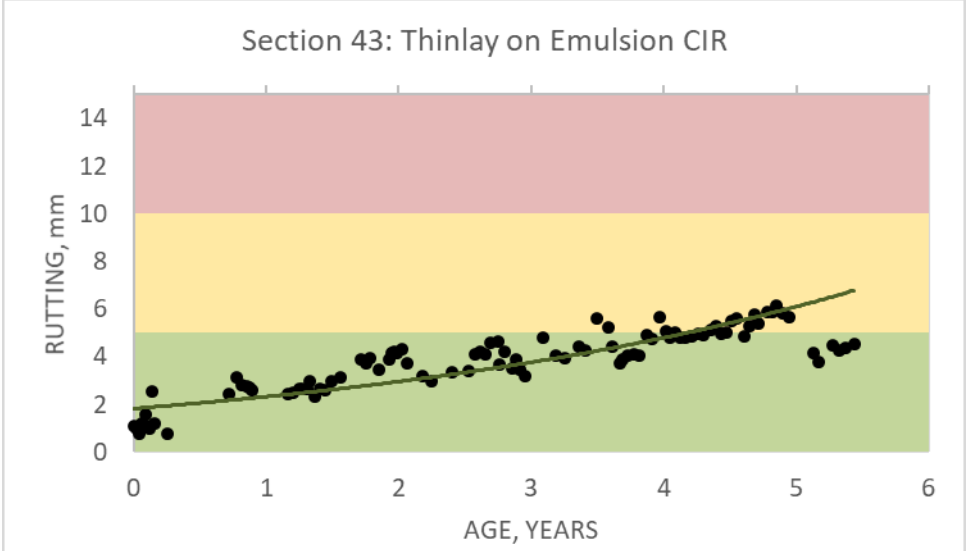
Lowest a

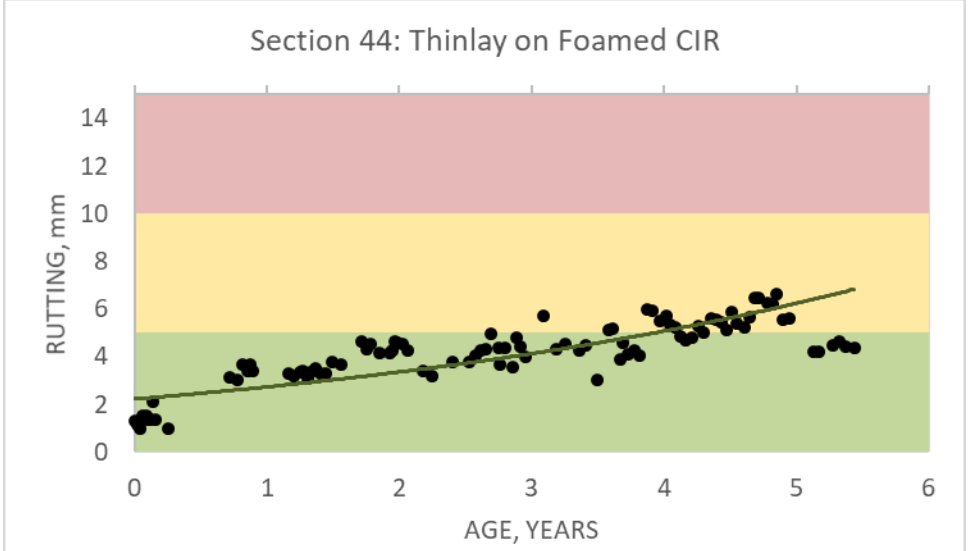
Highest a

Field Performance - Rutting

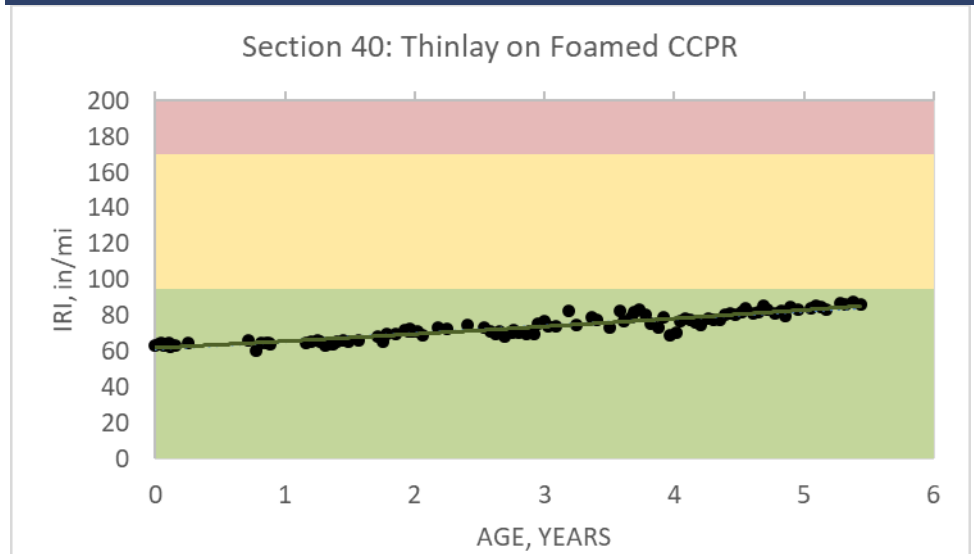


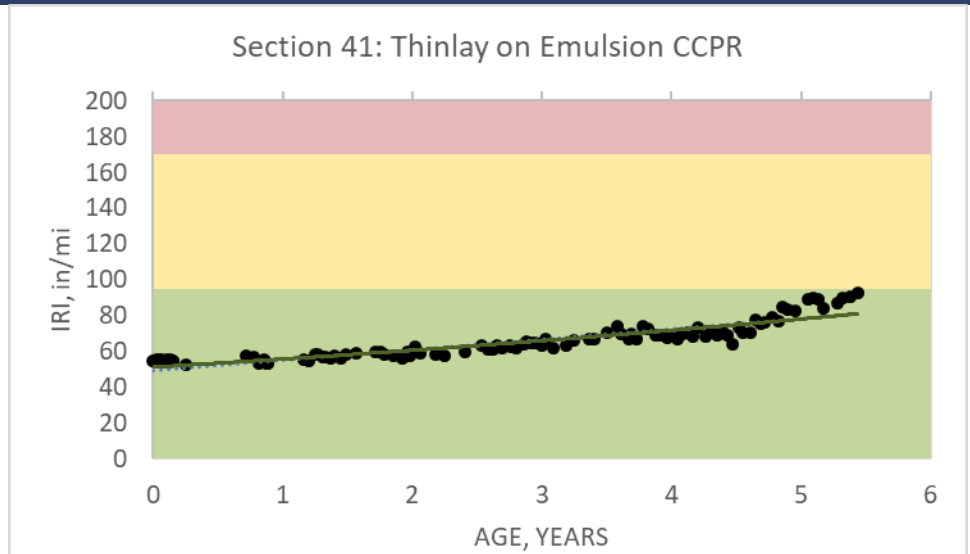


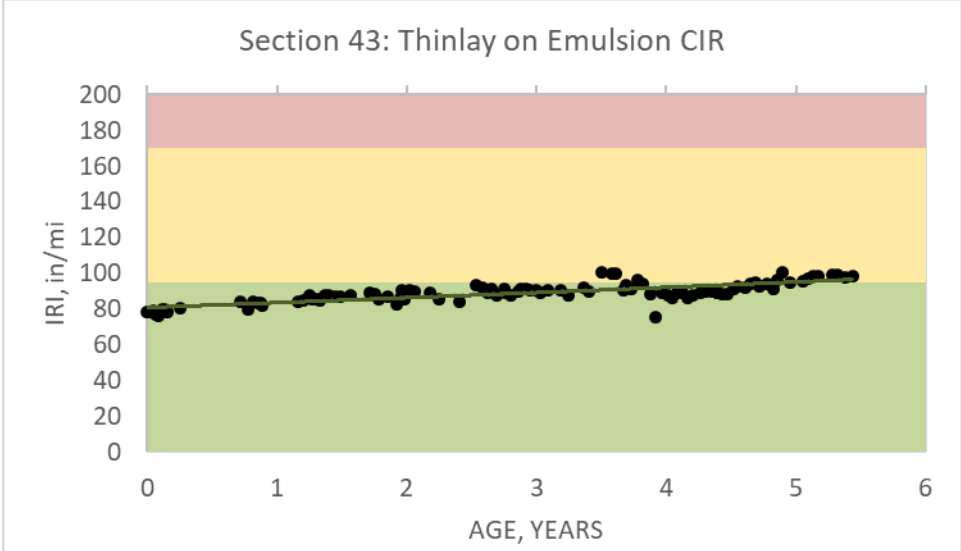


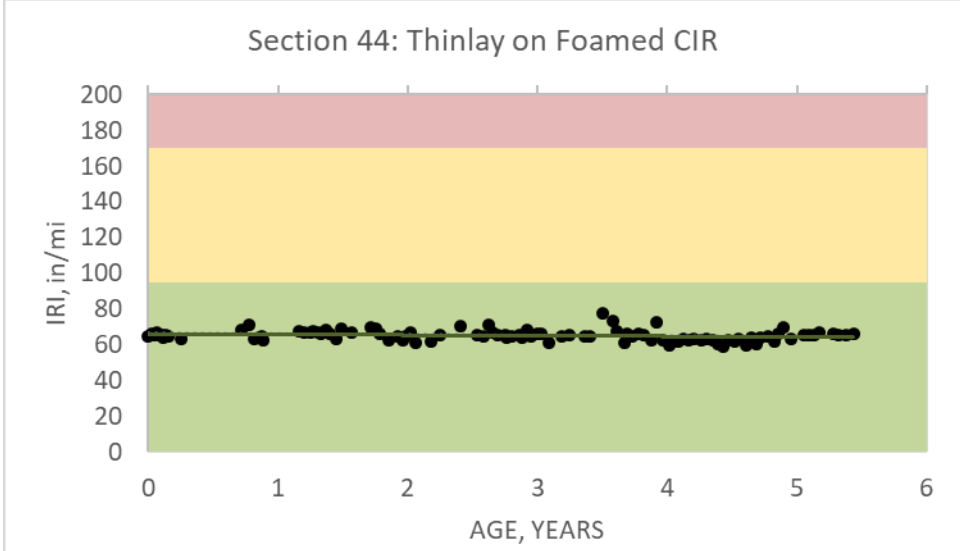


Field Performance - IRI

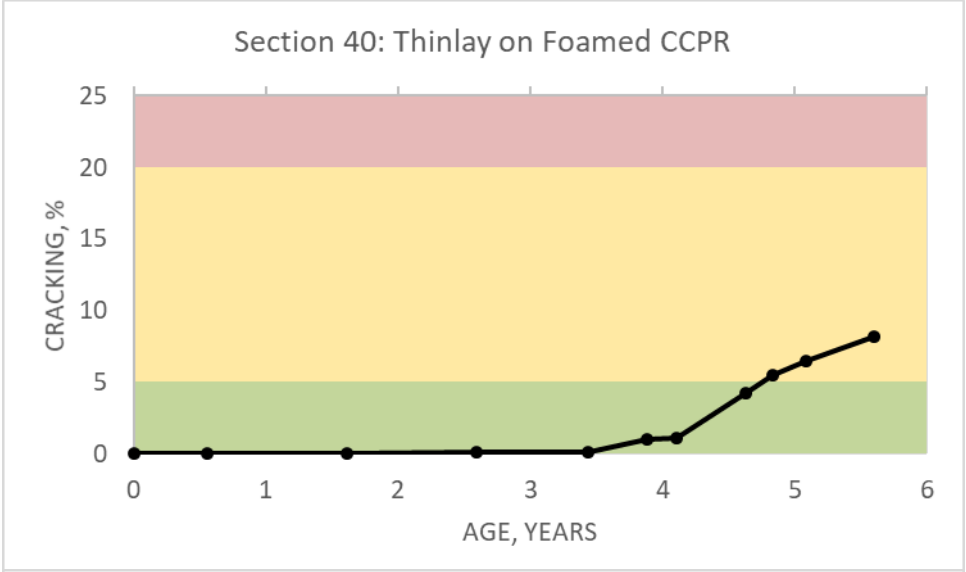


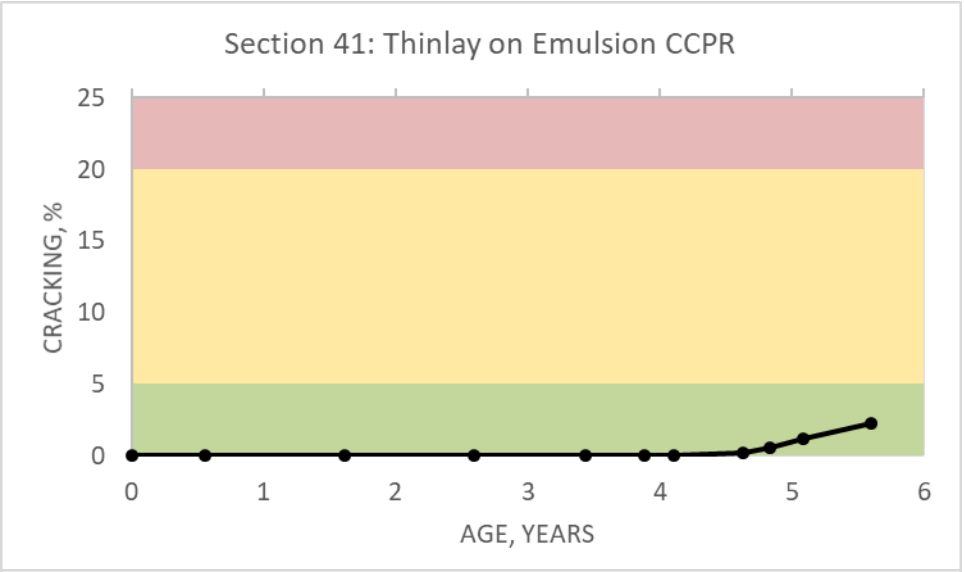


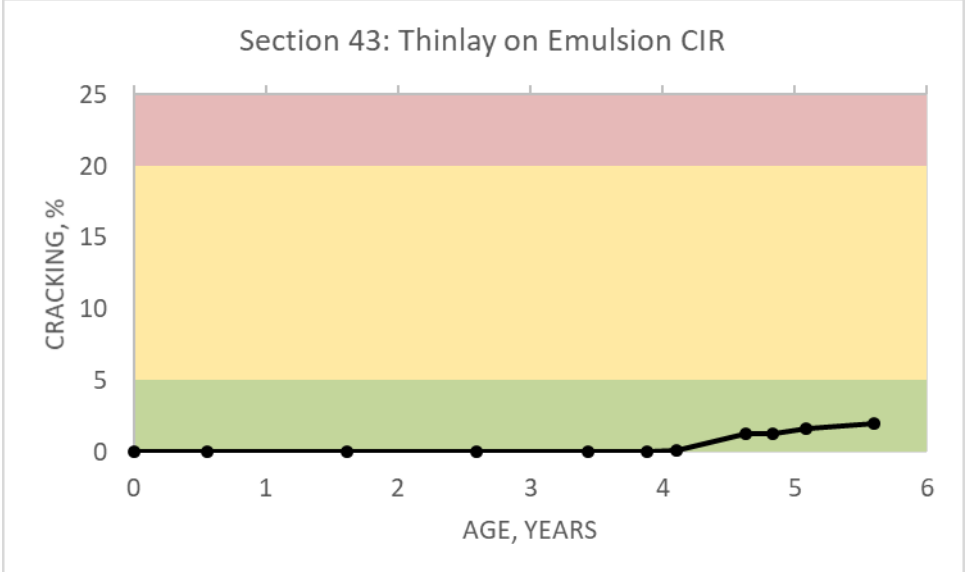


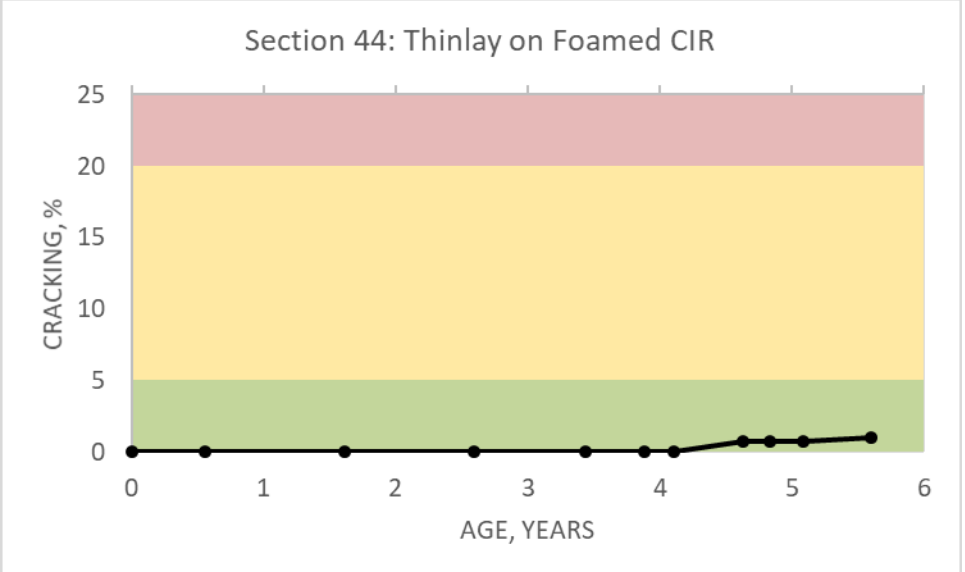


Field Performance - Cracking





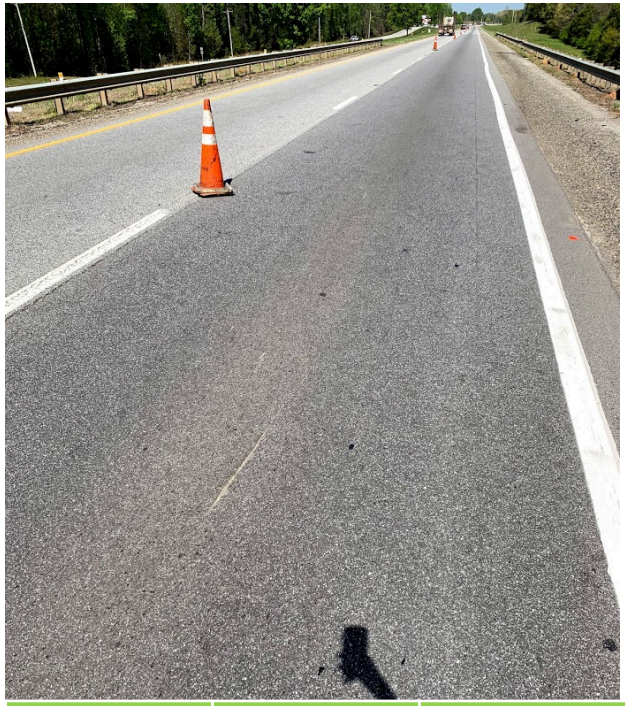




Section Overview

Cracking	IRI	Rutting

CCPR - Foam



Cracking	IRI	Rutting

CCPR - Emulsion

Cracking	IRI	Rutting

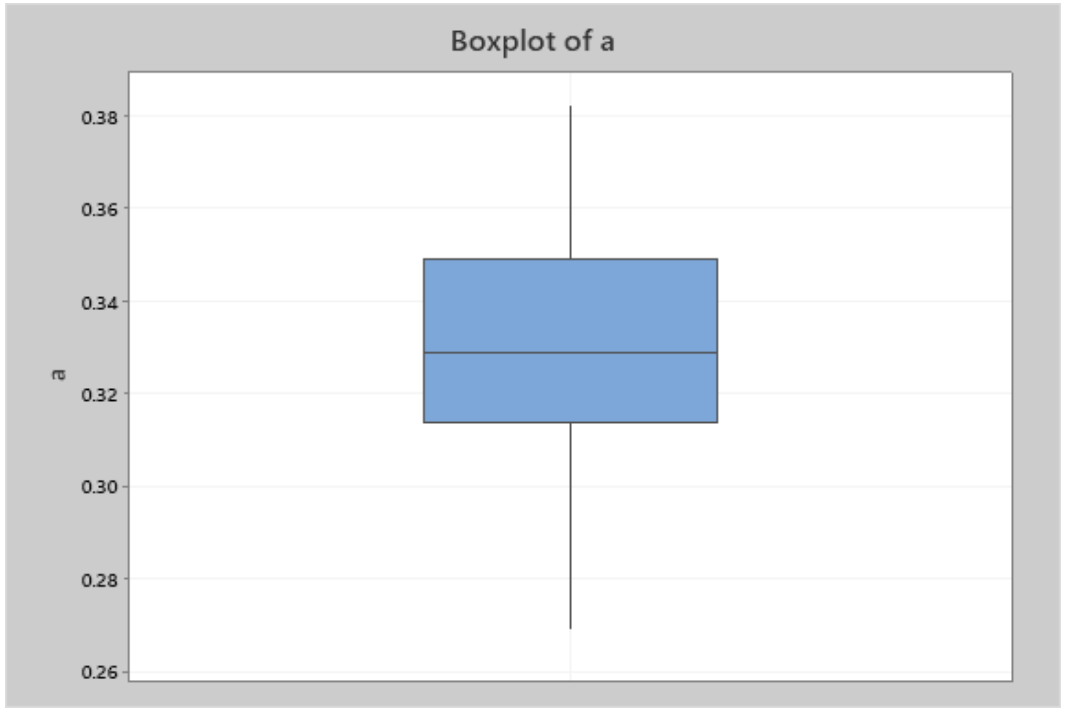
CIR - Emulsion

Cracking	IRI	Rutting

CIR - Foam

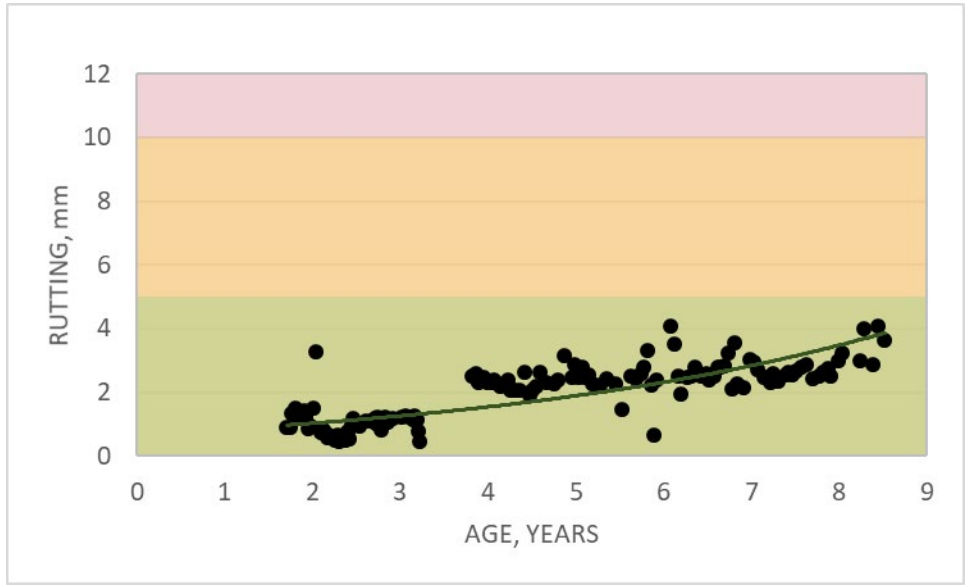
Structural Coefficients

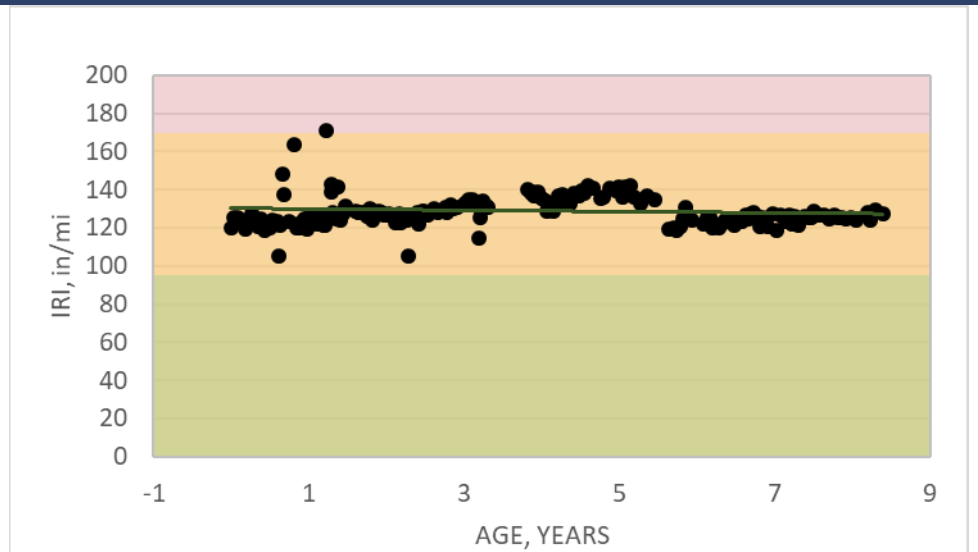
Section	Method	Recycling agent	N	Average	Std. Dev.
L20	CCPR	Foam	192	0.33	0.025

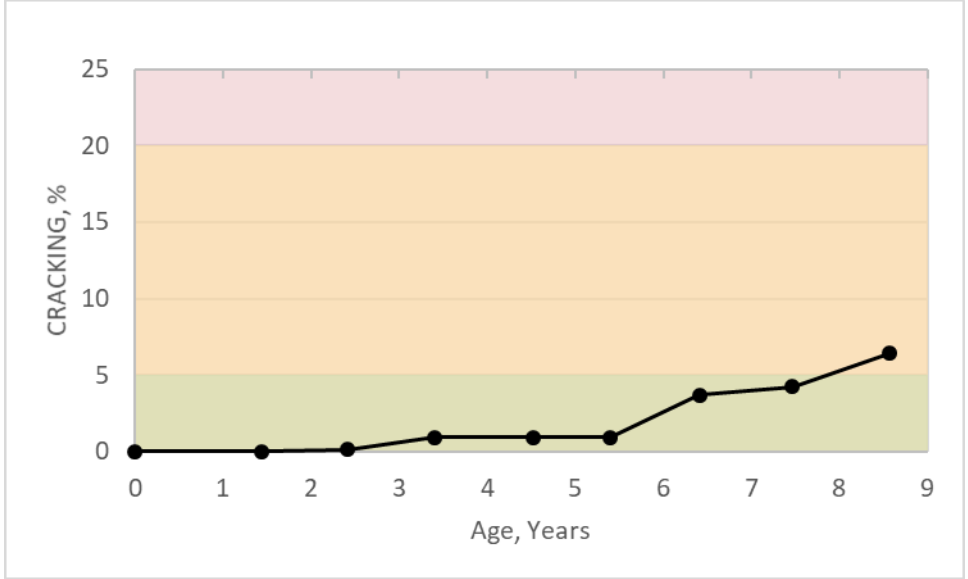


Field Performance – Lee Road 159

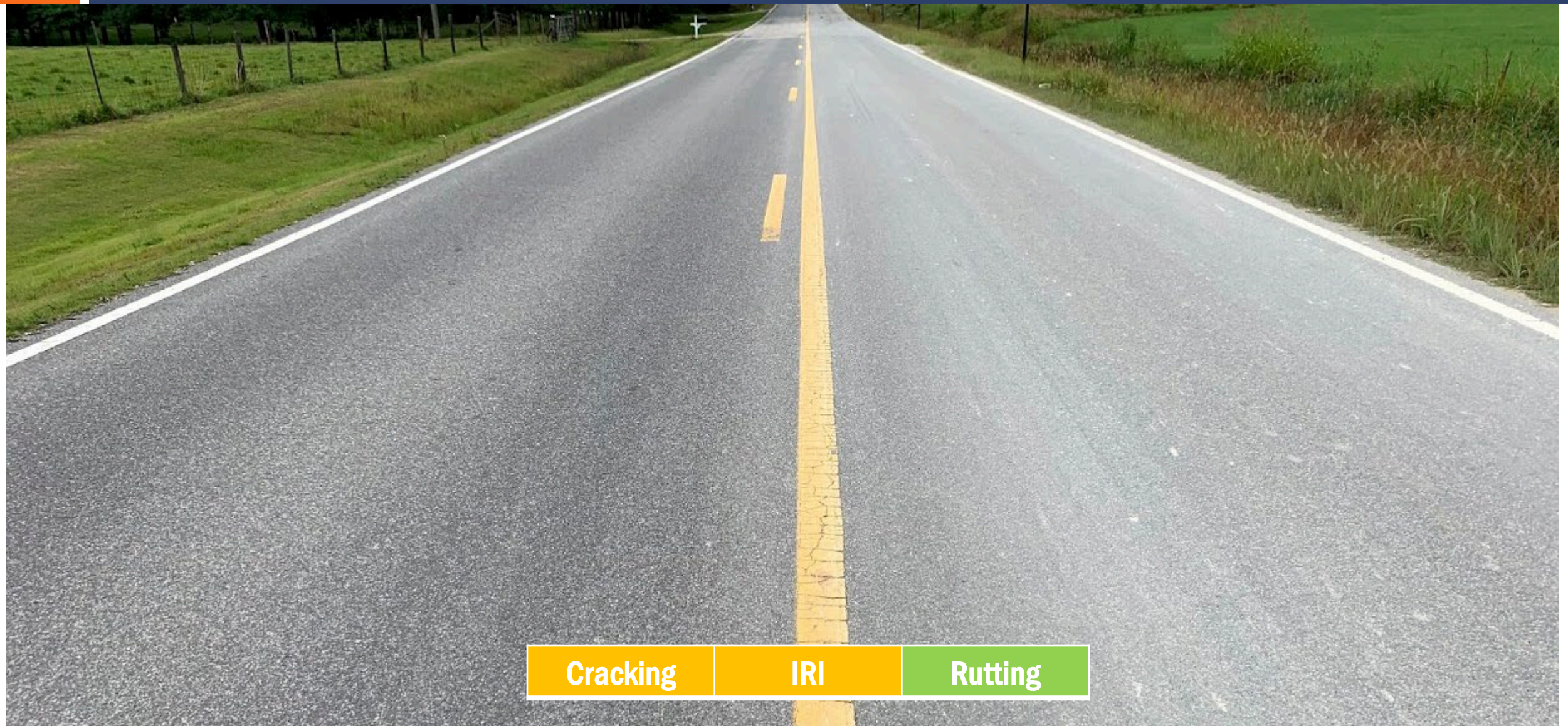
Section	Description	Rutting (mm)	IRI (in/mi)	Cracking (%)
L20	Foamed CCPR	3.6	130.7	6.4







Section Overview



Summary

- Results affected by method and recycling agent
- Good agreement with observed field performance
- No evidence of structural damage
- Results from newer Northern sections will help validate results

Questions and Answers

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