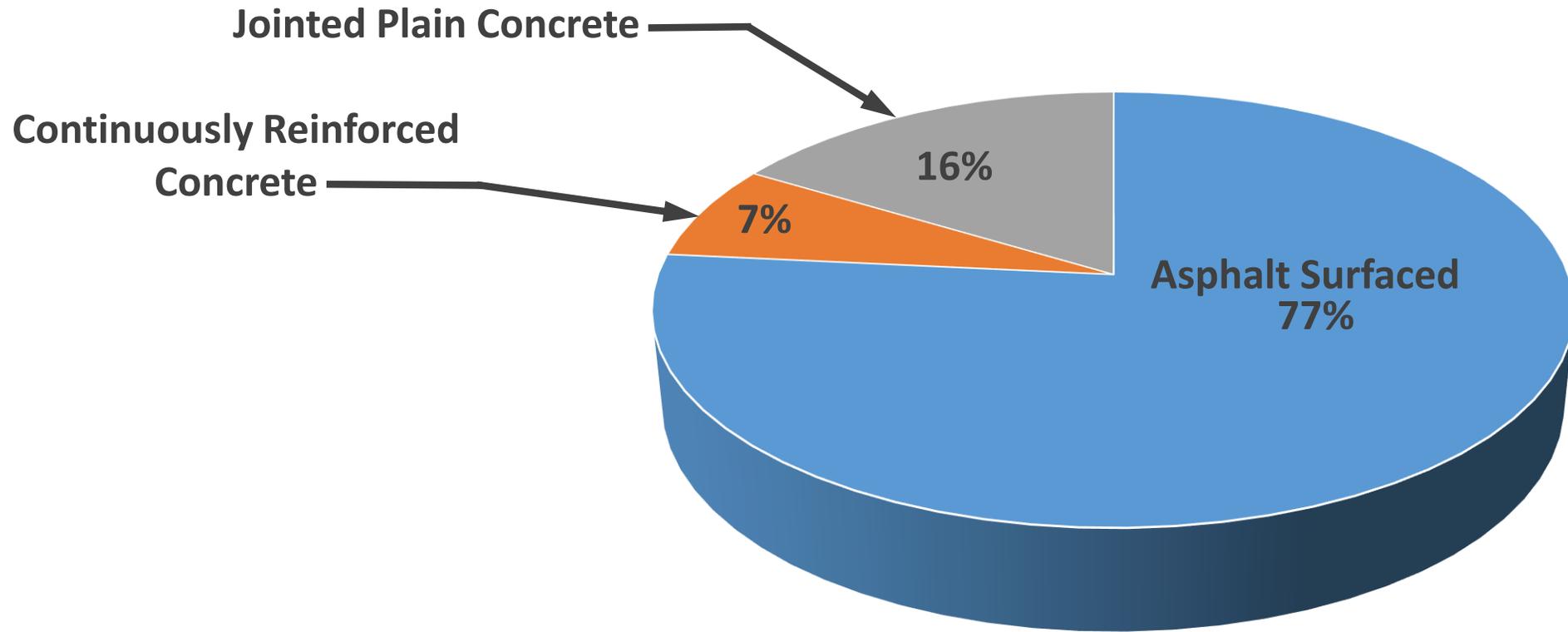


SCDOT's Concrete Preservation Program

Andy Johnson, PhD, PE(SC)
Pavement Design Engineer

March 1, 2019
Richmond, VA

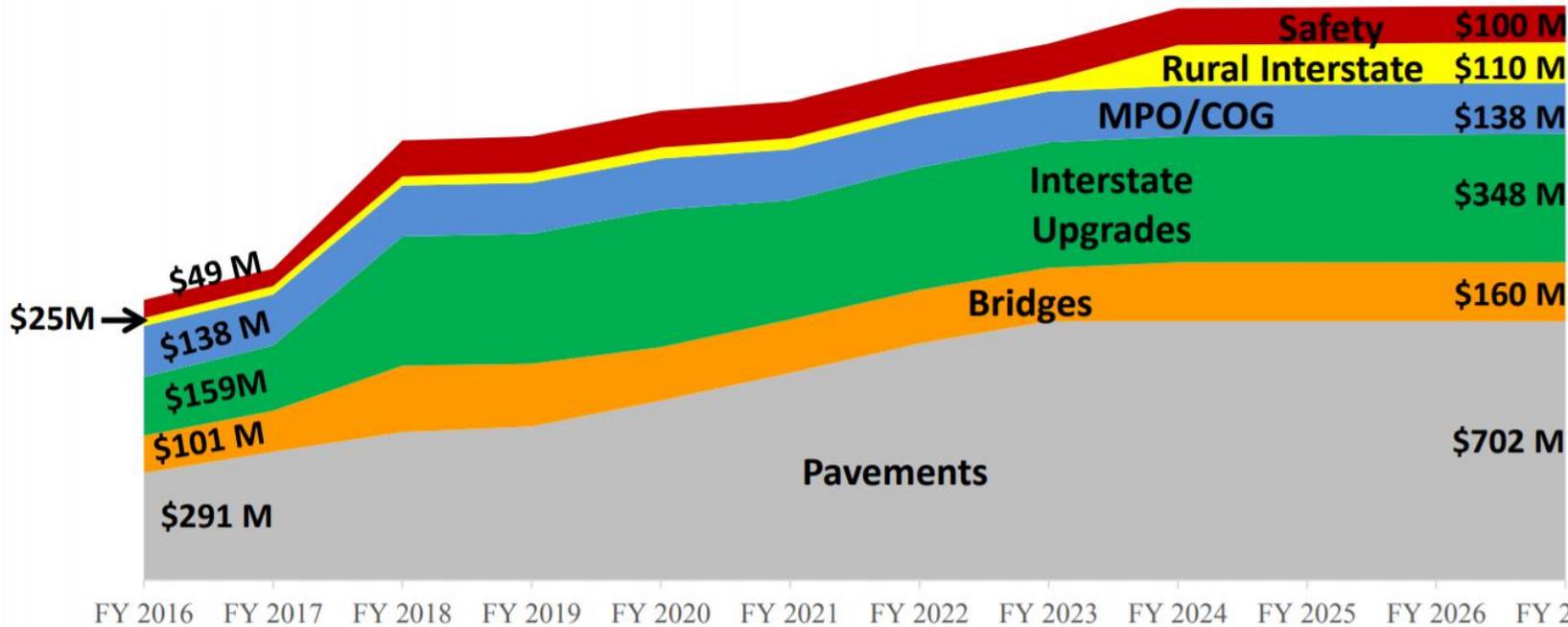
SC Interstate pavement composition - 2018



SCDOT increased gas tax for the first time since 1987 in 2017

- State motor user fee was increased by 5¢/gallon in 1987 to 16.75¢/gallon.
- 1987 increase was supposed to fund a widening program for rural routes.
- When roads didn't magically appear, 5¢ increase was “temporarily” diverted to the general fund in 1990, ostensibly to pay for Hurricane Hugo cleanup.
- Temporary = about 15 years
- New tax was 12¢/gallon, phased in 2¢ per year for six years.
- Full 12¢ will take effect July 1, 2022.

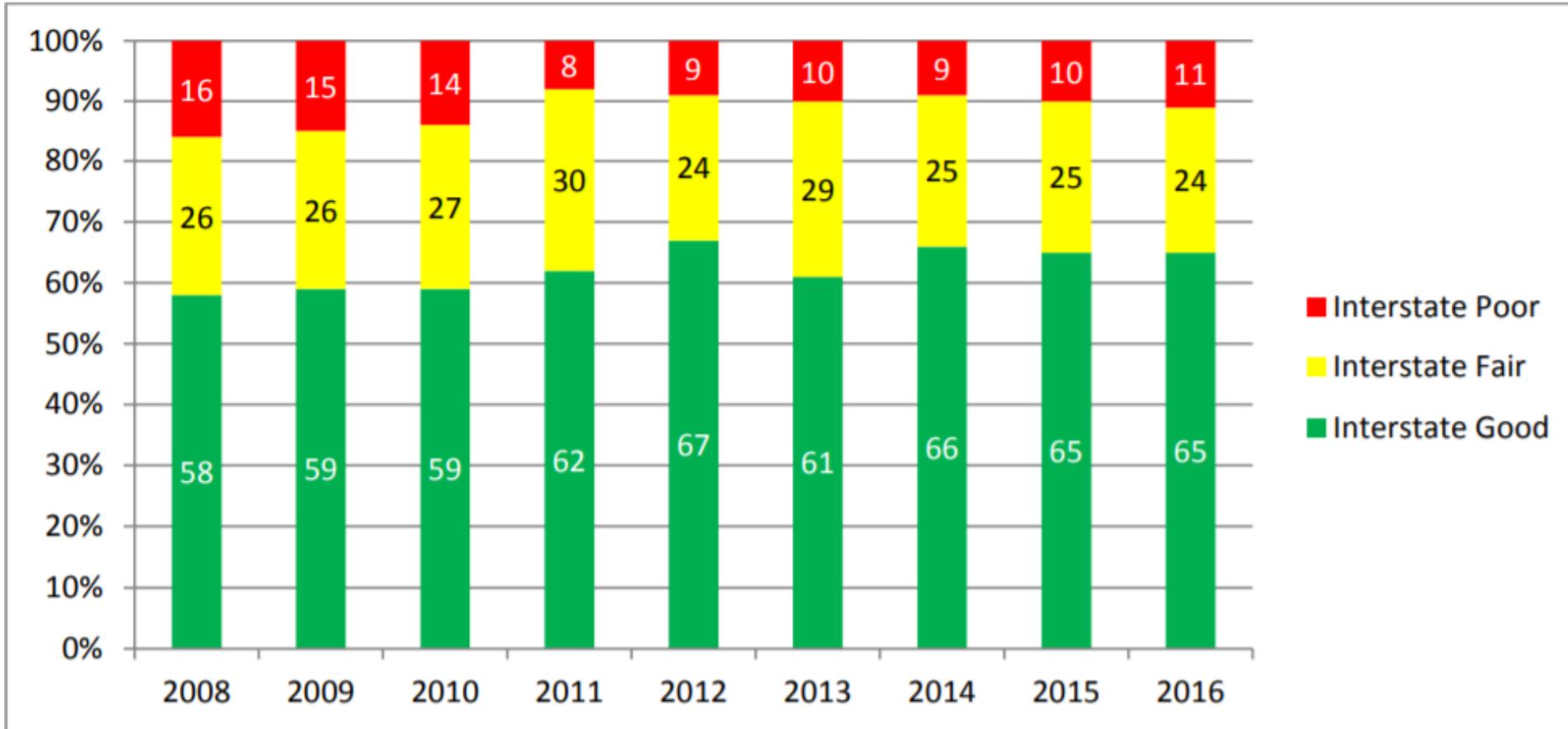
SCDOT Ten Year Investment Plan



Federal & State Funds Combined



SCDOT Interstate condition trend



Source: SCDOT Initial Transportation Asset Management Plan, April 2018

SC Gas Tax increase: Is it working?

Increase in second of six-year process



SC Gas Tax increase: Is it working?



By [Wright Gazaway](#) | November 12, 2018 at 6:23 PM EST - Updated November 12 at 7:05 PM

BEAUFORT, SC (WTOC) - In just its second year, the gas tax hike in South Carolina appears to be

Jogger Clearly On First Run Of Plan To Turn Life Around

2/09/16 1:33pm • SEE MORE: HEALTH ▾



CHICAGO—Taking note of the man’s beat-up tennis shoes, sweat-drenched shirt, and ill-fitting pair of sweatpants as he made his way down the sidewalk, witnesses reported Tuesday that area jogger Dan Andreychuk was clearly out on his very first run of a plan to turn his life

SCDOT-FHWA Maintenance Agreement



**MEMORANDUM OF AGREEMENT
FOR
FEDERAL-AID PREVENTIVE MAINTENANCE PROJECTS**

May 2015

Introduction

Preventive maintenance is a planned strategy of cost-effective treatments to extend the service life of pavements, bridges, and essential highway appurtenances without significantly increasing structural capacity. Preventive maintenance activities are eligible for federal assistance so long as the activities are shown to be a cost-effective means to extend the useful life of the highway and are located within a defined corridor with logical termini. The following guidance shall apply for preventive maintenance on all Federal-aid highway funded projects.

SCDOT-FHWA Maintenance Agreement

Eligible Preventive Maintenance Activities

PCC Pavement

1. Concrete joint/crack sealing
2. Diamond grinding
3. Diamond grinding
4. Isolated, partial, and/or full depth patch concrete repairs to restore the functionality of the slab
5. Slab replacement, not exceeding 50% of the total area

Interstate 20, MP 0 to 6, Aiken County, SC

- Opened to traffic in 1967.
- Estimate design lane has carried approximately 6 million trucks to date.
- 9" JPCP, 25' joint spacing, no dowels over 5" cement-stabilized sand clay.
- Has had at least two CPR projects in the last 25 years.
- In 2016, was in poor condition with substantial faulting.

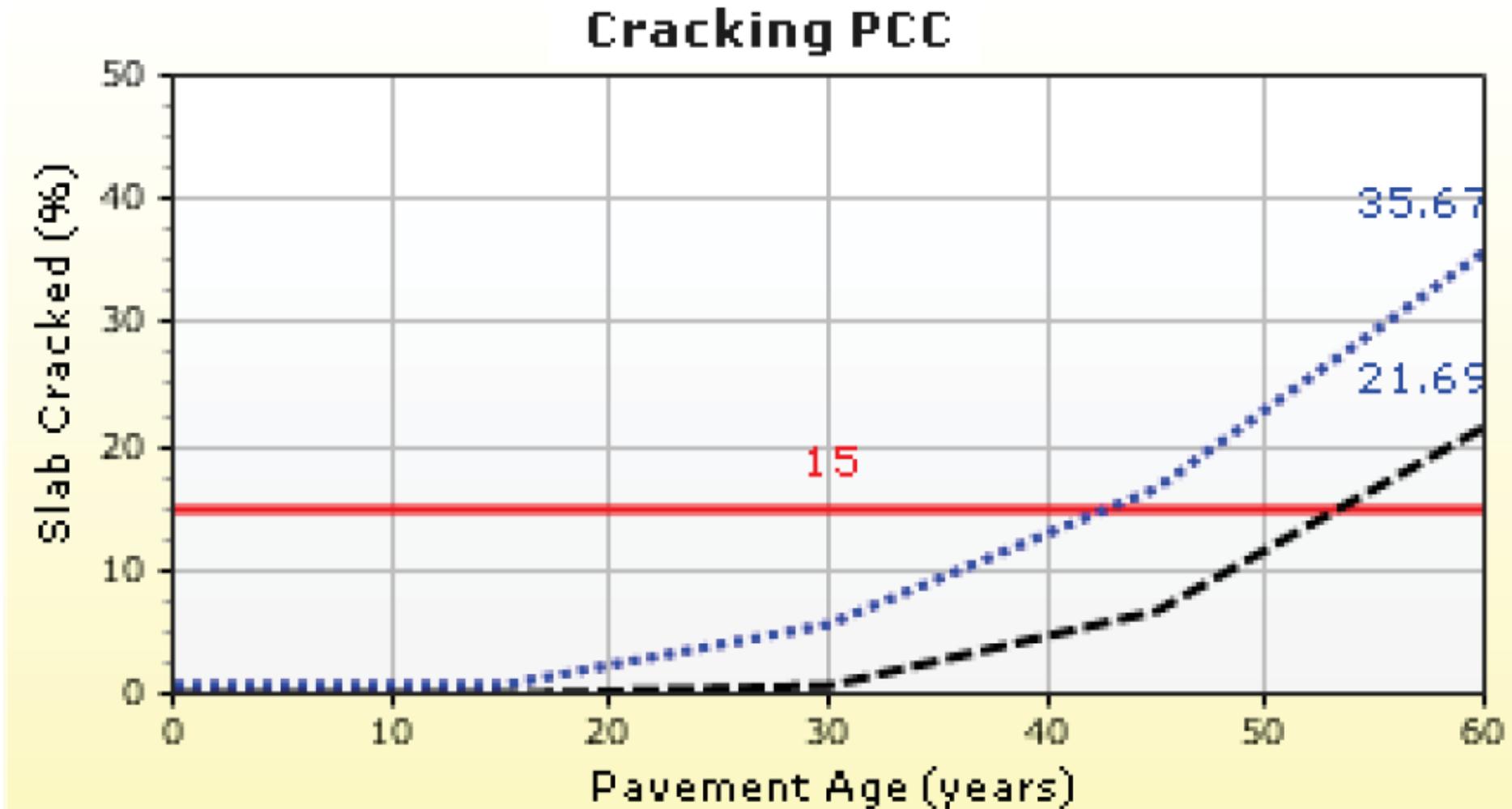
I-20, Near MP 2, October 2011



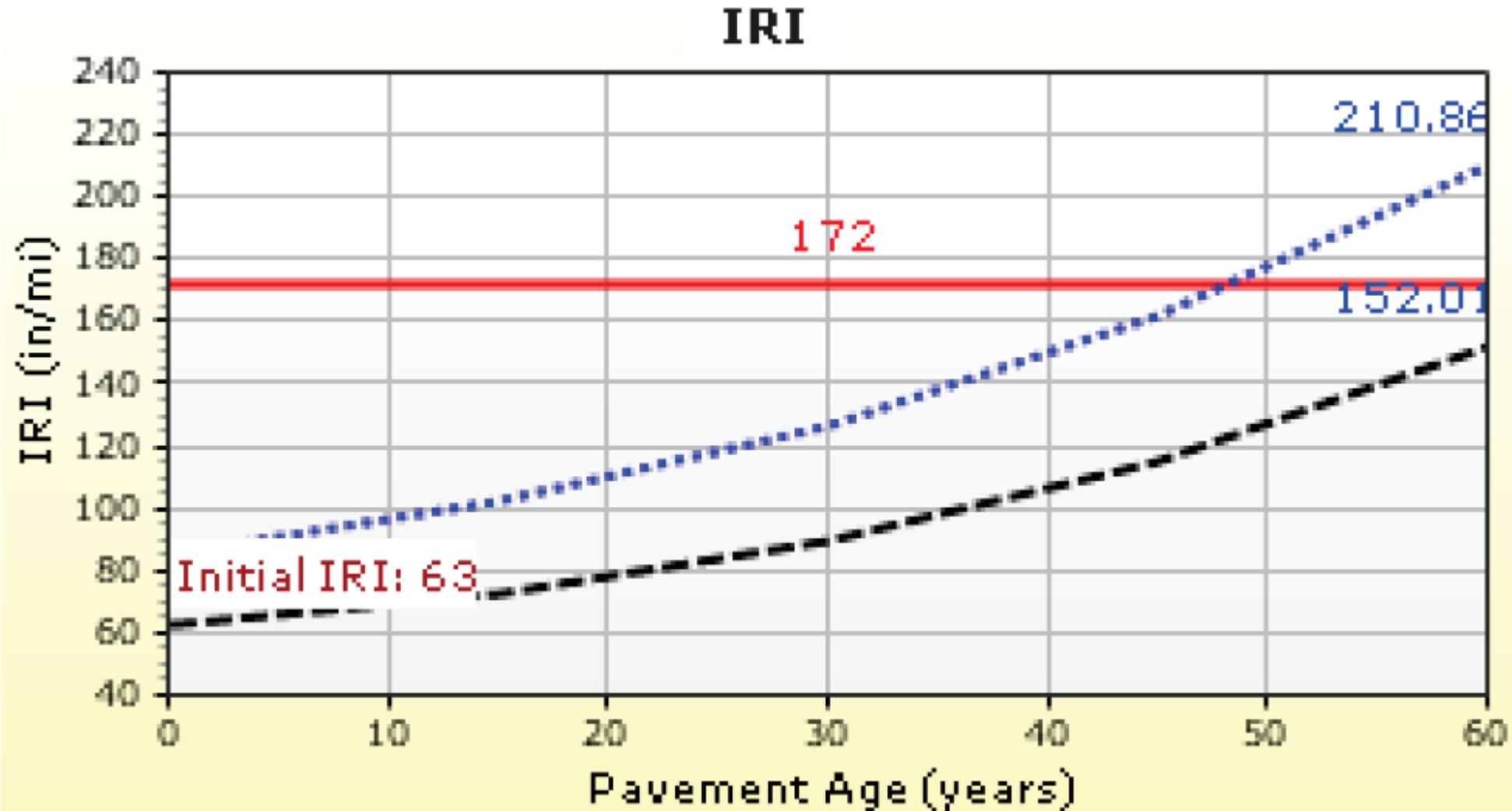
I-20, Near MP 2, April 2017



I-20, MP 0 to 6, PavementME forensic analysis, Year 0 = 1967



I-20, MP 0 to 6, PavementME forensic analysis, Year 0 = 1967



SCDOT recent concrete preservation projects

Project	Letting	Substantial Completion	Final Installed Price
I-20, Aiken Co.	4/12/2016	8/14/2017	\$4,061,387
I-95, Jasper Co.	4/12/2016	10/25/2017	\$6,124,176
I-95 & I-26, Dorchester Co.	7/12/2016	9/25/2018	\$16,590,730
I-95, Dillon, Clarendon, Florence Cos.	7/23/2016	6/30/2018	\$22,901,354
I-85, Anderson Co.	8/9/2016	6/9/2018	\$2,066,633
I-77, Fairfield and Richland Cos., I-20 Richland Co.	7/11/2017	Ongoing	\$10,357,035 (contract)
		<u>TOTAL</u>	<u>\$62,101,315</u>

SCDOT recent concrete preservation projects

Project	Patching	Grinding
I-20, Aiken	\$150.00/6035 sy	\$3.10/143,921 sy
I-95, Jasper	\$135.00/5039 sy	\$2.45/482,610 sy
I-95 & I-26, Dorchester	\$198.85/30,620 sy	\$2.97/1,166,770 sy
I-95, Dillon, Clarendon, Florence	\$178.60/51,760 sy	\$2.46/775,900 sy
I-85, Anderson	\$433.66/60 sy	\$2.47/747,600 sy
I-77, Fairfield & Richland/I-20 Richland Co.	\$175.80/23,425 sy	\$2.46/925,500 sy
Weighted Unit Price/Total Quantity	\$180.12/116,989 sy	\$2.66/3,775,451 sy

Patching influence on load transfer efficiency

- Load transfer efficiency (LTE) at joints and cracks is defined as:

$$\text{Efficiency (\%)} = \frac{\Delta_a}{\Delta_l} \times 100$$

where: Δ_a = approach slab deflection

Δ_l = leave slab deflection

- Low LTE is associated with faulting, pumping, and corner breaks.
- If planning an asphalt overlay, joints with LTE less than 60% to 70% should be improved prior to overlay to mitigate reflective cracking.

Load transfer efficiency observations

- SCDOT evaluated I-95 in Dillon County to observe the effect of patching on LTE.
- 10" JPCP, 5" cement-stabilized sand-clay base, 25' joint spacing, no dowels.
- Approximate pavement age is 50 to 55 years.

Patching influence on load transfer efficiency

Scenario	Approach Slab	Leave Slab	Approximate Percentage of Slabs	Load Transfer Efficiency
1	Patched	Patched	20%	85-89%
2	Cracked	Cracked	10%	40%
3 (Low Severity Fault)	Good	Good	25%	87%
4 (Moderate to High Severity Fault)	Good	Good	25%	69-75%
5	Good	Cracked	10%	70%
6	Cracked	Good	10%	Mixed Results*

Grooving for improved wet weather friction

- Around 2012, an area of I-95 near Florence was noted to have a high rate of run off the road wet weather accidents.
- Research in California and elsewhere beginning in the early-1970s indicated longitudinal grooving was effective in these circumstances. Georgia DOT also reported excellent results from grooving.
- Initial project was constructed in 2013, along with speed limit reduction from 70 mph to 60 mph in affected area.
- Wet weather accident rate was dramatically reduced.

Grooving for improved wet weather friction



Grooving for improved wet weather friction

- Included grooving in moderate quantities (17,430 sy and 72,372 sy) in a couple of the first preservation contracts. Prices were \$2.70/sy and \$2.15/sy, respectively.
- Areas for grooving were selected by SCDOT Safety Office based on wet weather run-off-the-road crash rates at various locations.
- In August 2016, let a large (720,122 sy) standalone grooving contract. Price was \$1.75/sy.
- Crashes of this type are reported to have dropped to near zero in grooved areas.

Thank you!

Andy Johnson, Ph.D., P.E. (SC)

Pavement Design Engineer

Ajohnson@SECement.org

(803)556-2889