

Pavement Recycling

*Process, Field Performance,
Sustainability and Savings*

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OVERVIEW

RECYCLING

- Why
- Process

RESEARCH IMPLEMENTATION

- I-81
- NCAT
- I-64



WHY RECYCLE PAVEMENTS?

COST

30% to 50% reduction

ADDRESS CAUSES

rather than symptoms

GREENHOUSE GASES

up to 50% reduction



ACCUMULATING RAP





5 ACRES



Luck Stone Corpora 2D

Google

More Than 10 Million Tons of RAP Stockpiled in Virginia





RECYCLING PROCESSES



FULL DEPTH RECLAMATION

- Stabilize the pavement foundation
- Typically 8-12 inches



COLD IN-PLACE RECYCLING

- Recycle the upper portions of the asphalt layers
- Typically 2-5 inches



COLD CENTRAL PLANT RECYCLING

- Similar to CIR but happens at a mobile plant
- Up to 8 inches
- Multiple layers
- Existing RAP



SO, WHAT HURDLES REMAIN?



LIMITED EXPERIENCE



FAILURE MECHANISMS ARE NOT
WELL UNDERSTOOD



FEW RECYCLING CONTRACTORS



SMALL NUMBER OF PROJECTS



IT'S SOMETHING DIFFERENT





VDOT RECYCLING RESEARCH EFFORTS

Help establish specifications

Monitor performance of existing VDOT projects

Provide design assistance

Synthesize experience from other agencies





VDOT RECYCLING RESEARCH I-81 2011 Year

AADT =
24,000

29% trucks
about 6,900
a day

About
17 million
ESALs

First project in US to
combine recycling
processes on the
interstate system



Left Lane

Right Lane

4-in Asphalt

4 & 6-in Asphalt

5-in CIR

6 & 8-in CCPR

~4-in Exist. Asphalt

8-in Agg Base

12-in FDR

Subgrade

Subgrade





VDOT RECYCLING RESEARCH NCAT 2012 - 2021

Auburn
University

2 cycles at
10 million
ESAL's per
test cycle

Instrumented
pavement
sections

Fleet of trucks drive
6 days per week for
2 year test cycles

Two sections continued
in 2018



NCAT Test Track Sections

N3

6-inch AC
5-inch CCPR
6-inch Agg Base
Subgrade

N4

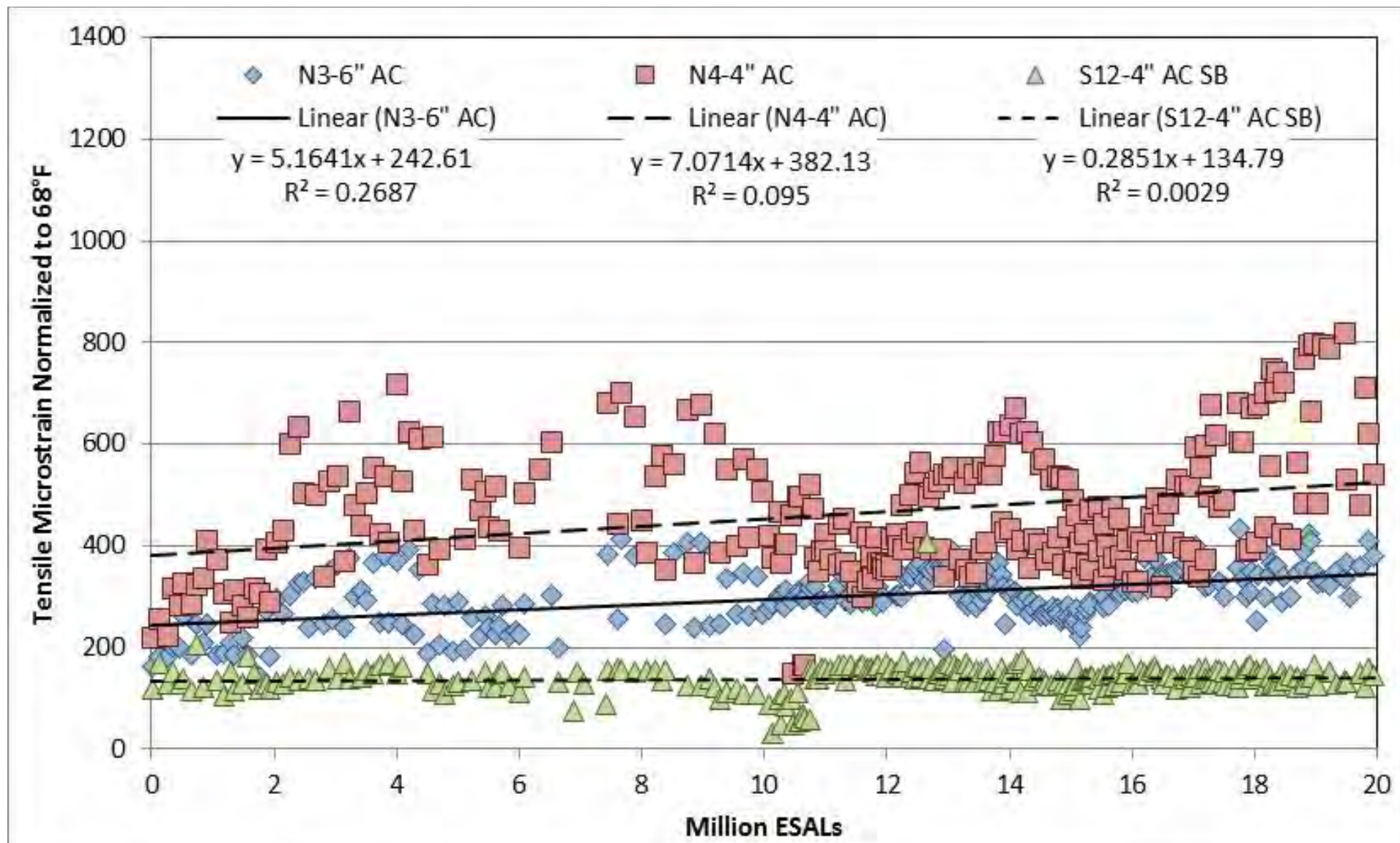
4-inch AC
5-inch CCPR
6-inch Agg Base
Subgrade

S12

4-inch AC
5-inch CCPR
8-inch FDR
Subgrade







Section S12

S12



Recycled Content

- Layer 1 = 12.5%
- Layer 2 = 30%
- Layer 3 = 100%
- Layer 4 = 100%

Entire Cross Section

- 80% recycled





Implementing Research: I-64



SEGMENT 1 – 5.6 MILES

- Widen, overlay existing jointed concrete
- Finished 2017



SEGMENT 2 – 7.8 MILES

- Widen, reconstruct
- Estimated finish Spring 2019



SEGMENT 3 – 8.3 MILES

- Widen, reconstruct
- Start Mid 2018, finish 2021

I-64 RECYCLE DESIGNS

NEW LANES

Import crushed concrete or RAP, stabilize in FDR process

- 12" FDR
- 2" OGD
- 6" CCPR
- 4" SMA (12.5/19.0)

EXISTING LANES

FDR existing base after concrete is removed

- 12" FDR
- 2" OGD
- 6" CCPR
- 4" SMA (12.5/19.0)





Processed RAP

100% passing
12.5mm



#10's



CCPR

- 85% RAP
- 15% 10's











I64: CONSIDERING SEGMENTS 2 & 3

FDR & CCPR are Included

More Than 1 Million Tons of Material
Will be Recycled

Compared to A Traditional Design,
Cost Savings Will Exceed \$15 Million

Still Working on Greenhouse Gas
Calculations



SO, WHAT'S NEXT?

- 🔍 INSTRUMENTING I-64
- 🔍 UPDATED VDOT PAVEMENT DESIGN GUIDES
- 🔍 MORE ALTERNATE BID PROJECTS
- 🔍 CONTINUED LAB RESEARCH
- 🔍 MATERIALS CERT. CLASSES





Questions

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