

Tying Flexible Pavement Preservation to Treatments

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Pavement preservation

- Federal Highway Administration (FHWA)
- RoadResource.org
- Transportation Research Board
- MINK
- Braham



Micro surfacing in Arkansas

No one definition

Pavement preservation: FHWA (EDC-4)

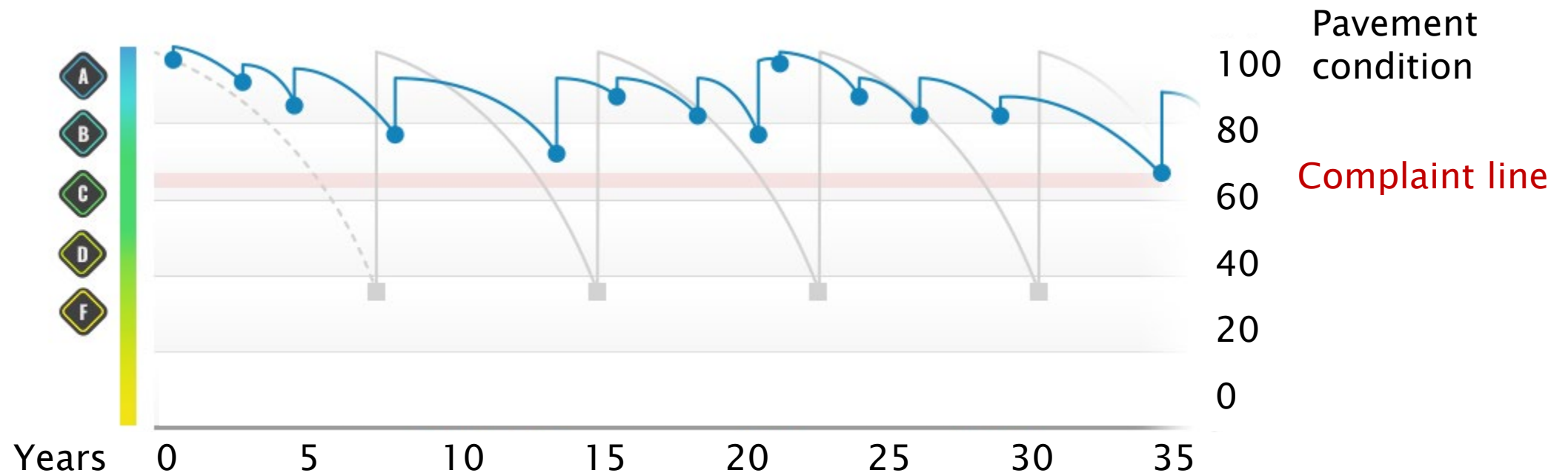
- ▶ Work that is:
 - Planned and performed
 - Improves or sustains the condition of the transportation facility in a state of good repair
- ▶ When
 - Applying a pavement preservation treatment at the right time
- ▶ Where
 - On the right project
- ▶ How
 - With quality materials and construction



See “FHWA-16-CAI-018”

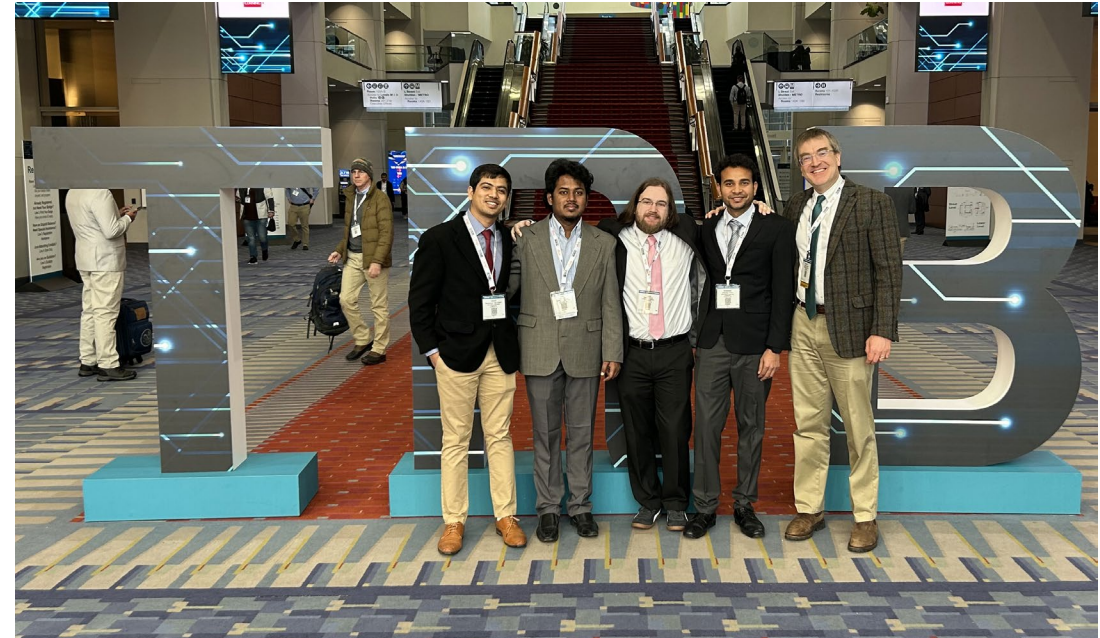
Pavement preservation: RoadResource.org

- ▶ Cost-effective, green approach
- ▶ Get most life out of your roads
- ▶ Making taxpayer dollars go further
- ▶ Faster application times



Pavement preservation: TRB

- ▶ AKT20: Proactive use of cost-effective treatments to extend the life of existing pavements
- ▶ Compare to maintenance (AKT30):
 - Routine and reactive maintenance
 - Including deterioration and subsequent means/methods to treat resulting deficiencies



Braham and his research team at TRB

**Note: AKT20 and 30 joined to form:
AKN18 “Pavement Maintenance, Preservation, and Rehabilitation”**

MINK

► Missouri

- Keeping good roads in good condition
- Slowing down future wear before major rebuilding is needed

► Iowa

- Improving functional condition of road network using
- Preventive maintenance treatments
- Reducing the overall rate of deterioration of pavement assets

► Nebraska

- Consists of overlays, mill and fill, crack seal
- From Surface Transportation Program for 2027, asset preservation

► Kansas

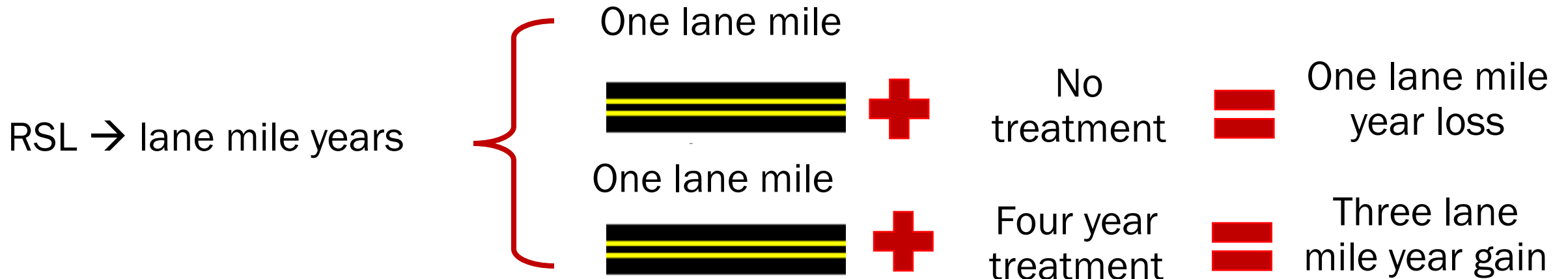
- Maintaining or extending the life of the driving surface
- Overlay, mill and overlay, pavement patching, and joint repair



Pavement preservation: Braham

Pedro and Andrew at "The Tent"

- ▶ Entire network in PCI A or B condition
 - Very good or good
- ▶ Remaining service life (RSL) = zero
 - Pavement network "static"
 - Does not change



What is a pavement's purpose?

1. Safe traveling surface
2. Structural capacity
3. Water drainage
4. Surface friction
5. Smoothness



I-40 in eastern Arkansas

All five required for proper performance



1. SAFETY

2. Structural
capacity

- 3. Water drainage
- 4. Surface friction
- 5. Smoothness

Pavement structure

Pavement surface

If structure is sound – can we just focus on the flexible pavement surface?

Flexible pavement surface treatments

- ▶ Just liquids (least “intensive”)
 - Fog seal, rejuvenating fog seal, crack seal
- ▶ Liquids + rocks
 - Chip seal, slurry seal, scrub seal, micro surfacing
- ▶ Combination treatment
 - Chip seal/scrub seal plus fog seal
 - Cape seal (chip or scrub + slurry or micro)
- ▶ Asphalt mixture based (most “intensive”)
 - Ultrathin bonded wearing course (UTBWC)
 - Thin lift asphalt mixture



Chip seal asphalt emulsion in Wisconsin

Preservation – network

Maintenance – individual road/treatment

Surface treatments: liquids

► Crack seal

- >1/8" in summer, working crack; otherwise crack fill
- Place adhesive material into crack
- Prevents moisture, material infiltration into pavement
- Hot asphalt, polymer/rubber modified, asphalt emulsion
- Additional resources: ISSA Guideline A175 and NCHRP Report 784



Crack seal in Nebraska

► Fog seal

- Spray diluted asphalt emulsion
- Stops raveling, seals minor cracks, restores oxidized surface
- Can have rejuvenating components



International Slurry
Surfacing Association:
slurry.org

Surface treatments: liquids + rocks

- ▶ Chip seal
 - Asphalt emulsion/hot applied binder with aggregate chips distributed on top
 - Provides skid resistance and impermeable layer, stops raveling, seals minor cracks
 - ISSA Guideline A165
- ▶ Slurry surfacing (slurry and micro)
 - Asphalt emulsion mixed with fine aggregate
 - Provides skid resistance, restrict moisture intrusion, stops oxidation and raveling
 - ISSA Guidelines A105, A115, A143



Chip seal in Kansas



Micro surfacing in Arkansas

Surface treatments: combination

- ▶ Surface friction + color/retention:
 - First treatment: chip seal or scrub seal
 - Second treatment: fog seal
 - High surface friction from chip/scrub
 - Black color and aggregate retention from fog
- ▶ Cape seal
 - First treatment: chip seal or scrub seal
 - Second treatment: slurry surfacing
 - Impermeable layer, strong seal from chip/scrub
 - Smoother surface and surface friction from slurry/micro



Chip seal: both lanes, plus fog seal right lane
(forconstructionpros.com)

Get the best of both worlds!

Surface treatments: asphalt mixture

- ▶ Ultrathin bonded wearing course
 - Polymer modified asphalt emulsion + open graded asphalt mixture, <1" thick
 - Placed using a spray paver
 - Restores surface friction, provides new traveling surface, seals pavement surface
- ▶ Thin lift asphalt mixture
 - Asphalt mixture <1.5" thick (ultrathin <1.0")
 - Restores surface friction, provides new traveling surface
 - FHWA Tech Brief: FHWA-HIF-19-053



UTBWC in New York

What about AASHTO resources?

AASHTO Resources

Emulsion Treatment	Material Standard	Design Practice Standard	Construction Guide	Quality Guide
Chip seal	AASHTO M 340	AASHTO R 102	NCHRP 14-37	Yes
Micro surfacing	AASHTO M 341	AASHTO R 103	NCHRP 14-37	Yes
Slurry seal	AASHTO M 342	AASHTO R 104	NCHRP 14-44	Yes
Fog seal	AASHTO M 343	AASHTO R 105	NCHRP 14-37	No
Sand seal	AASHTO M 344	AASHTO R 106	NCHRP 14-48	Yes
Scrub seal	AASHTO M 345	AASHTO R 107	NCHRP 14-44	Yes
Ultrathin bonded overlay	AASHTO M 346	AASHTO R 108	NCHRP 14-48	Yes

Search “Emulsion Task Force”: Click specifications – some drafts available

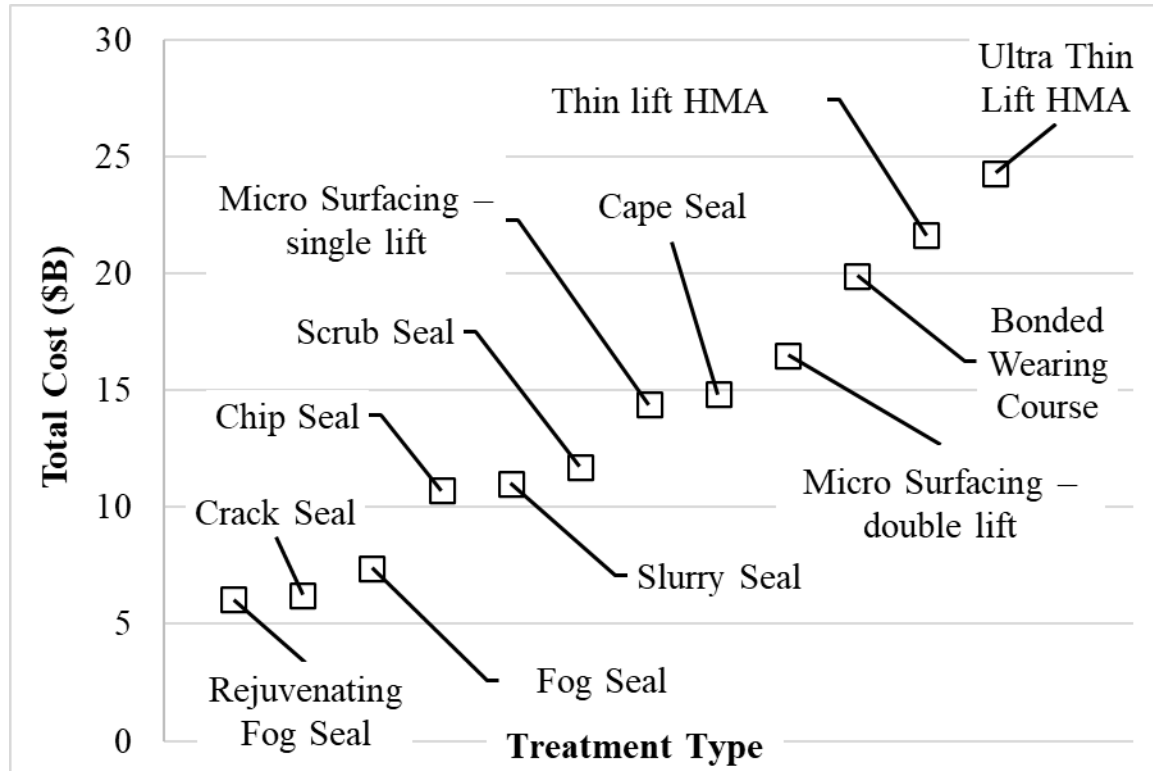
What does pavement preservation save? Money, life, emissions



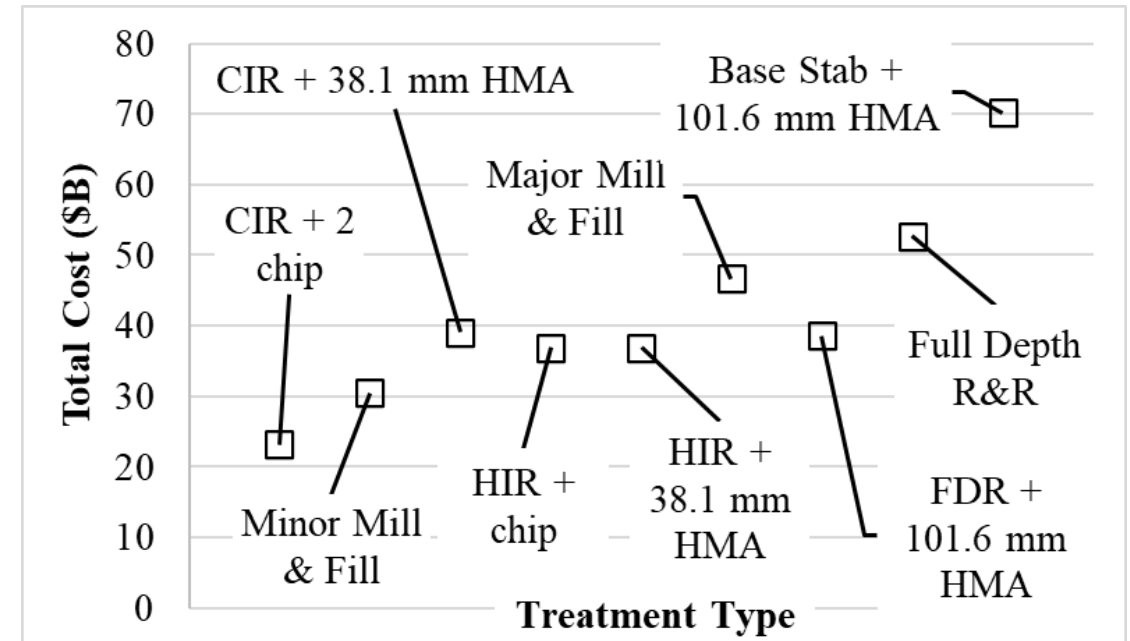
Pavement preservation: saves money

One treatment, 50 years, entire ARDOT network*

*Not realistic, an academic exercise



Surface treatments



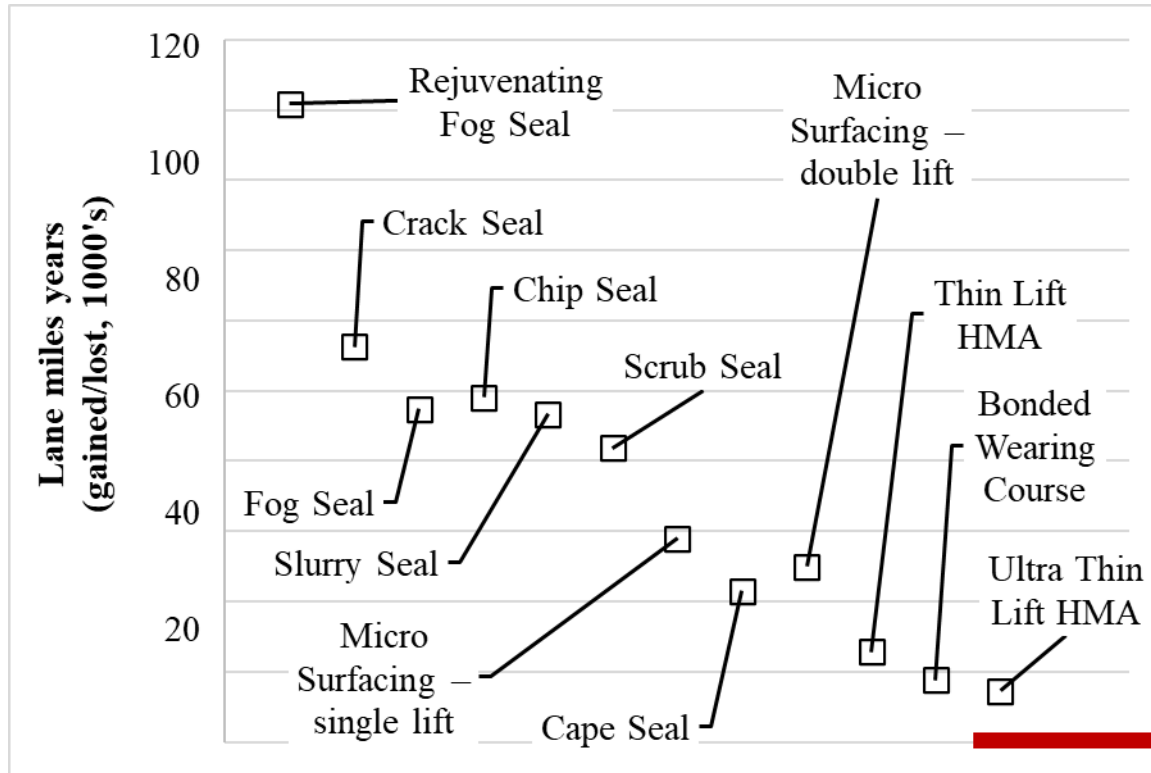
Structural treatments

Less intensive treatment? Lower cost

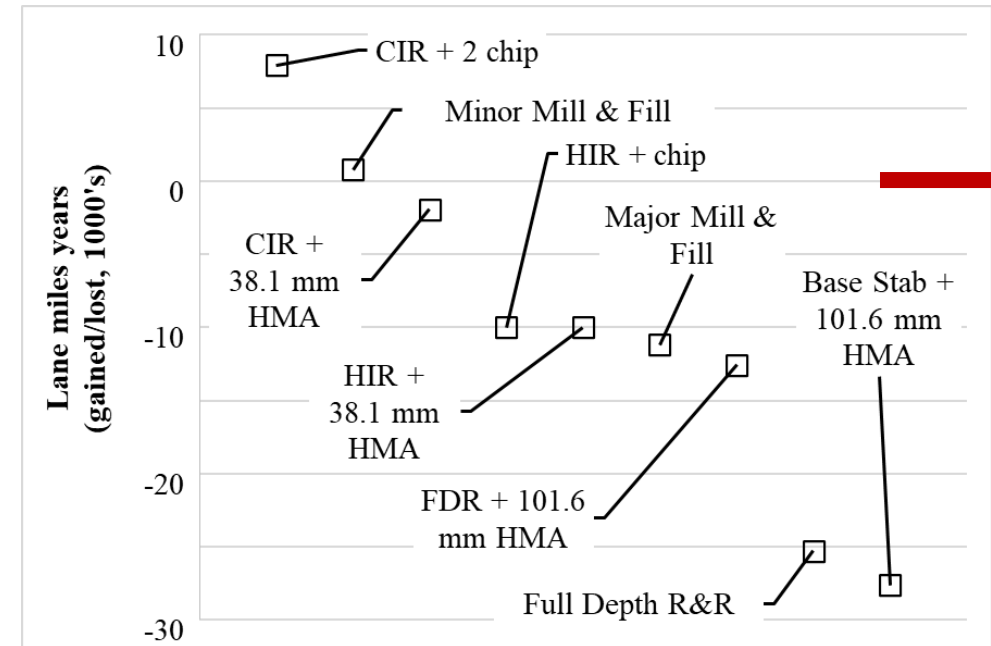
Pavement preservation: saves life

One treatment, 50 years, entire ARDOT network*

*Not realistic, an academic exercise



Surface treatments



Structural treatments

Above red line? Network gaining life.
Below? Network losing life

Pavement preservation: reduces emissions

6.2 miles long, 56 feet wide, 4.0 inch surface layer

Year since construction	Strategy I	Strategy II
5	-	Fog seal
8	-	Micro surfacing
15	Mill & fill (3.0 in)	Thin HMA overlay (1.3 in)
24	-	Chip seal + fog seal
30	Mill & fill (3.0 in)	Cold in-place recycling (3.0 in) + thin HMA overlay (1.3 in)

Strategy II saves ~35,000 tonnes Greenhouse Gas Emissions

Pavement preservation: want to learn more?

- ▶ YouTube Pavinars – free online!
 - “Pavement Preservation”
 - “Flexible pavement combination maintenance treatments”
- ▶ Money and life (academic exercise)
 - “Exploring the Influence of Pavement Preservation, Maintenance, and Rehabilitation on Arkansas’ Highway Network: An Education Case Study”
- ▶ Bonus money and life (more realistic scenario)
 - “Quantifying Pavement Preservation in Arkansas”
- ▶ Emissions
 - “Road Use Contributions to Energy Consumption and Greenhouse Gas Emissions for Two Flexible Pavement Maintenance Strategies”

Wrap up

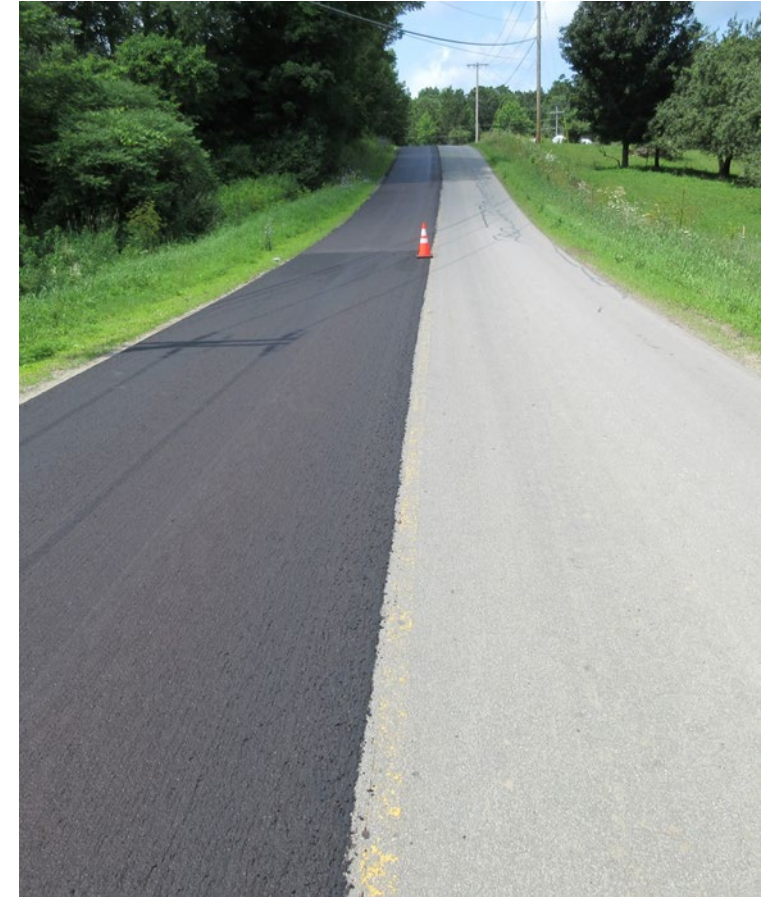
- ▶ Pavement preservation
- ▶ Pavement maintenance = surface treatments
- ▶ ISSA and AASHTO resources
- ▶ Preservation: saves money, life, emissions
- ▶ Want to learn more? YouTube Pavinars

Questions?

Thank you!

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Please connect on LinkedIn ☺
“Andrew Braham Arkansas”



Slurry seal in New York



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