Thin Asphalt Concrete Overlays

Southeastern Asphalt User/Producer Group

Annual Meeting

November 19, 2014

National Center for Asphalt Technology NCAT at AUBURN UNIVERSITY

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Outline

- NCHRP Synthesis Topic 44-07
- Purpose/Scope
- Use
- Design and Construction
- Performance, Maintenance, Rehab
- Case Studies
- Conclusions

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Purpose/Scope

- Document current experience/research
- Agency/industry survey
  - 43 States
  - 8 Private Industry companies

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Advantages of Thin Overlays

- Provides long service life (when placed over structurally sound pavements)
- Provides good riding surface
- Reduces noise (fine-graded mixes)
- Maintains grade and slope geometry
- Is easily maintained
- Is recyclable

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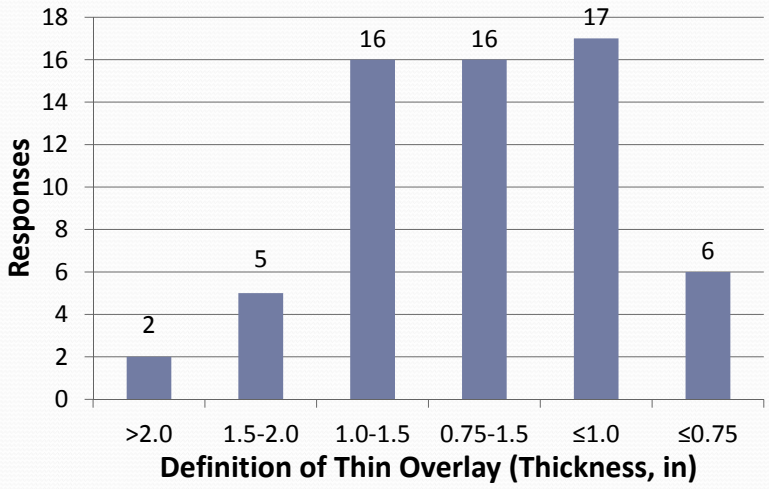
Thin Overlay Definition



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Previous Research

- NAPA – (Newcomb, 2009) IS 135
- Zubek – Cold Regions, 2012
- Montana – (Cuelho, 2006)
- NCHRP Synthesis 222 – (Zimmerman, 1995) Project/Treatment selection

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Montana Survey

Preventive Maintenance Treatment	Average Service Life (Years)	Cost per Lane Mile (12 feet wide)
Thin Overlay	8.4	$14,600
Double Chip Seal	7.3	$12,600
Microsurfacing	7.4	$12,600
Slurry Seal	4.8	$6,600

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Project/Treatment Selection Strategies (NCHRP Synthesis 222)

- Current condition rating
- Prediction models ("What if" scenario)
- Network Optimization models
- Find treatment that addresses deficiencies (may be affected by local policies/mandates)

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Types of Thin Overlays

- 9.5 and 12.5mm Superpave
- 9.5 and 12.5mm SMA
- UTBWC
  - Arkansas
  - Illinois, Kansas, Louisiana, Minnesota, Vermont
- 4.75mm Superpave and SMA
- OGFC/PFC

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UTBWC

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Use of Thin Overlays

Pavements that are failing, or have already failed, cannot be successfully treated with a thin overlay alone.

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PennDOT Use of Thin Overlays

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Where Not To Use Thin Overlays

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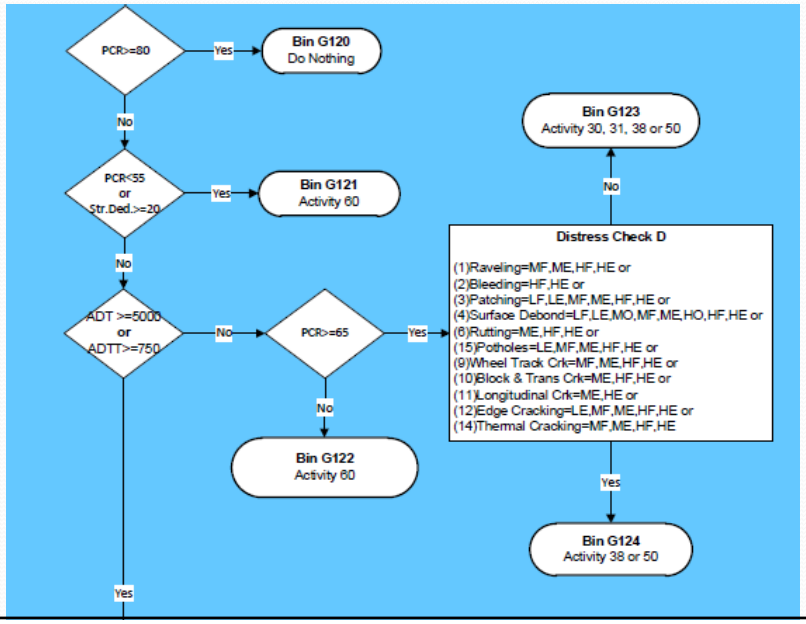
Ohio Decision Tree



NCAT Pavement Preservation Study

Section	18	19	20	21	22	23	24	25
Surface	4.75/PG 67-22	4.75/PG 67-22	4.75/PG 76-22	4.75/PG 76-22	UTBWC	4.75 50% RAP	4.75 5% Shingles	4.75 PG 88-22
Subsurface	Fibermat	Existing	Full-Depth Reclamation	Existing	Existing	Existing	Existing	Existing

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Design and Construction

- Aggregate – Superpave quality standards
- Binder – Often modified
- Compaction level – 50 gyrations, locking point, other
- Testing constraints

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RAP May Need to be Crushed/Fractionated

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Design and Construction

1% increase in moisture = 10-12% increase in drying cost while reducing production about 11%.

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Design and Construction

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Design and Construction

As a general rule, only 40-60% improvement in ride quality can be expected with a single layer of asphalt mix.

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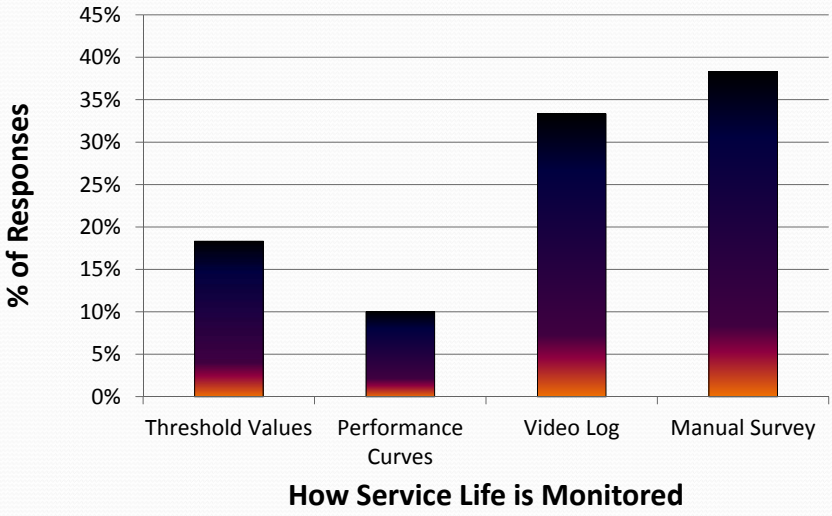
Performance, Maintenance, Rehab



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Performance Measures (Purdue Study)

Performance Indicator	Roughness (IRI)	Condition (PCR)	Rut Depth
Threshold Used	110 in/mi (1.74 m/km)	85	0.25 in (6 mm)
Expected Life (Yrs.)	7 - 10	7 - 11	8 - 11

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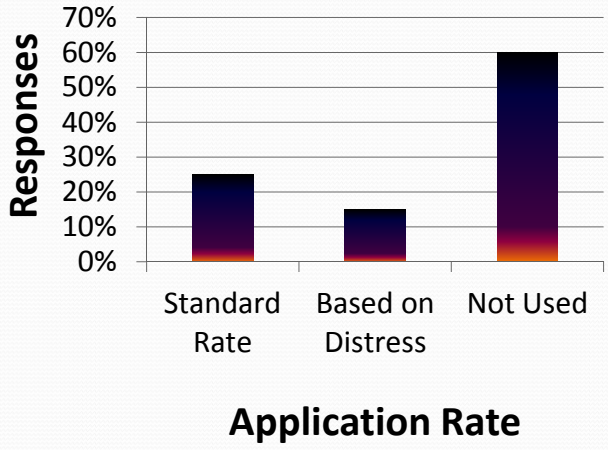
Maintenance

(Fog Seal/Rejuvenator Application)



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Service Life

- LTPP Data (Liu, 2013)
  - 341 Thin Overlay Sections
  - 40 States, 8 Canadian Provinces
- Median life expectancy – 7 to 9.5 years

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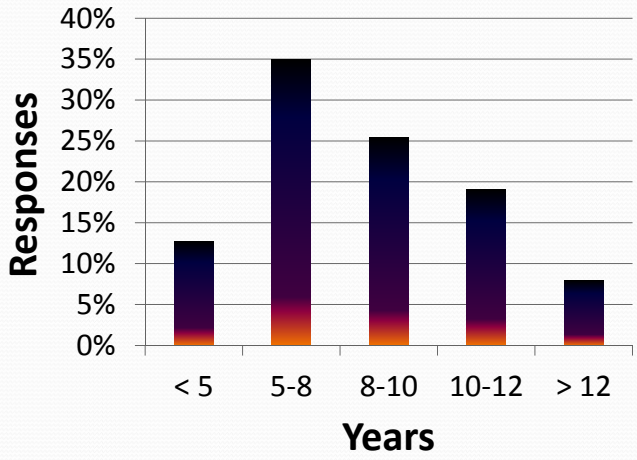
Service Life



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Explanations for Range in Service Life

Environmental Differences

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Explanations for Range in Service Life

Construction Quality Standards - Interstate versus Secondary

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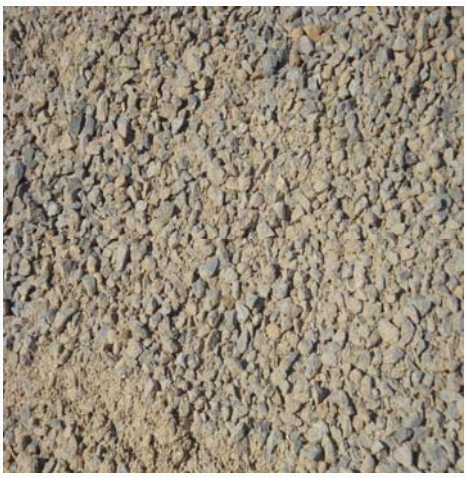
Explanations for Range in Service Life



Variation in material quality

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Explanations for Range in Service Life

Temporary Fix

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Cost/Benefit of Preservation Treatments

- Wang, 2012 – 29 state agencies
  - Thin Overlays cost more initially
  - Extended pavement life the longest
- Oregon (Parker, 1993) – 87 sites within state
  - Thin overlays most cost-effective
  - Particularly more effective for heavy traffic

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Case Studies - Tennessee

Bid Prices for Preservation Treatments

Year	Microsurfacing ($/sy)	4.75 mm NMAS ($/sy)
2013	2.02	2.24
2011	2.41	1.88
2009	2.15	2.09

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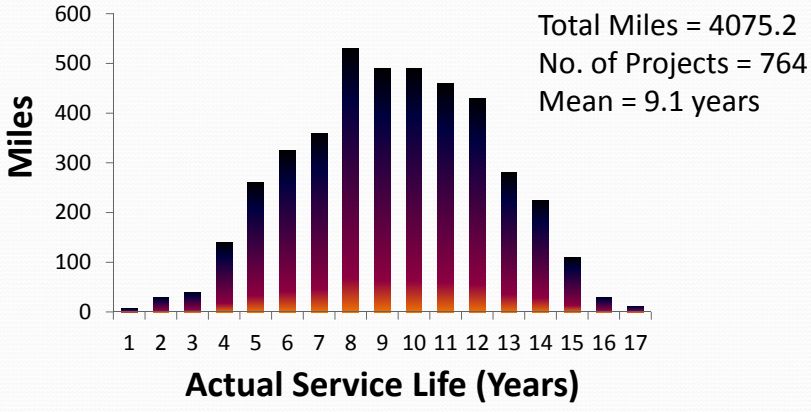
Case Studies - Ohio

Mileage vs Service Life of Thin Overlays



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Conclusions

- Thin overlays routinely used as maintenance/preservation tool
- Thin overlays are economical
- Thin overlays extend life of concrete pavements
- Success depends on existing distresses
- Service life generally in 7 – 11 year range
- Some test procedures not reliable for thin layers

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