



Life-Cycle Cost Analysis of Pavement Preservation Techniques in Texas

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Presentation Outline

- Introduction
- Case Study
- Life-Cycle Cost Analysis
- Conclusions



Introduction

Objective

- Develop a probabilistic life-cycle cost analysis framework to evaluate and compare pavement maintenance treatments
- Study the effect of facility type, as well as traffic volume and loads

Justification

- Timely maintenance
- Hardly any data
- Methodology to quantify the benefits

Assumptions

- Same treatment
- Pavement condition



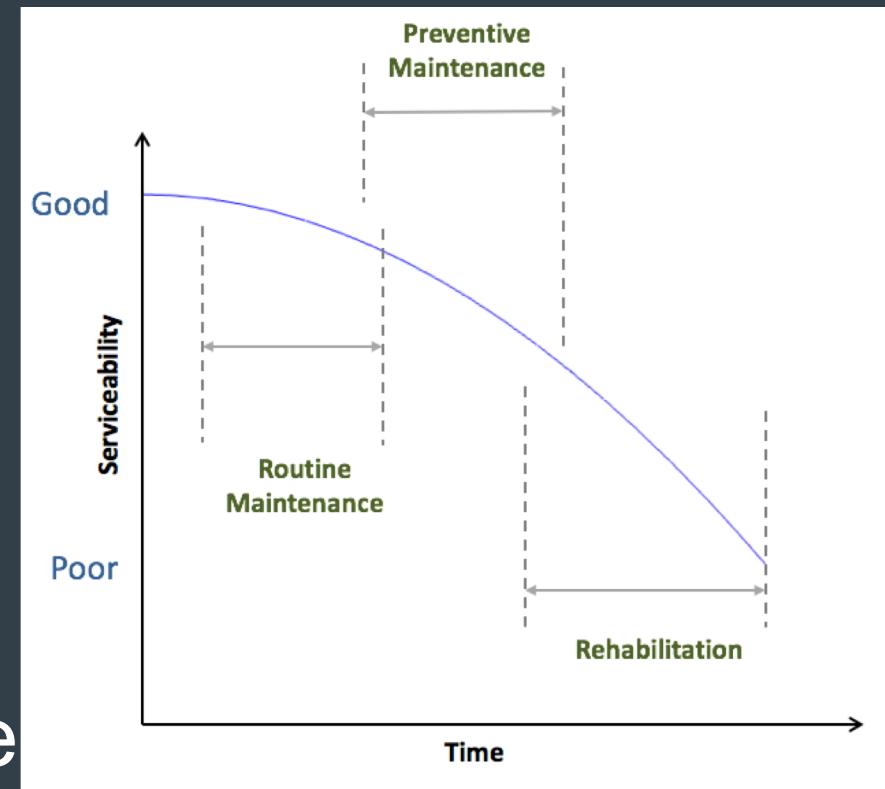
Introduction

Pavement Preservation

1. Routine maintenance
2. Preventive maintenance
3. Minor rehabilitation

Preventive Maintenance

- Chip Seal
- Microsurfacing
- Thin Overlay





Chip Seal

- Improve surface friction
- Reduce permeability
- Seal small cracks
- Used as a wearing course



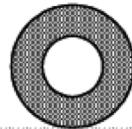
<http://www.asphaltsmart.com/>

Dave Hein

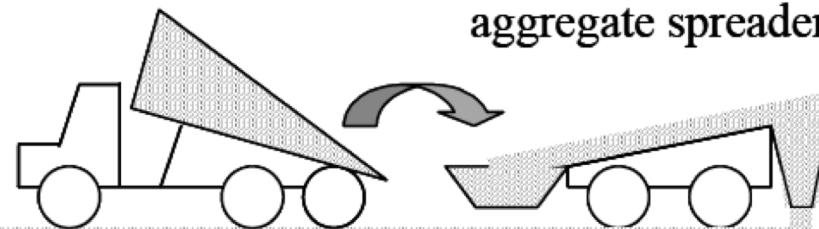
Power broom
or sweeper



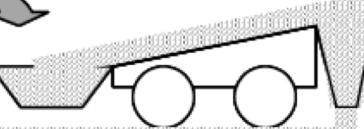
Rubber-tired
rollers



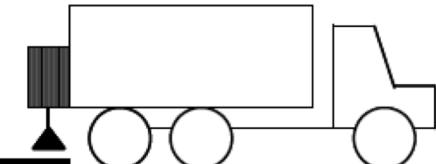
Cover aggregate



Self-propelled
aggregate spreader



Asphalt
distributor



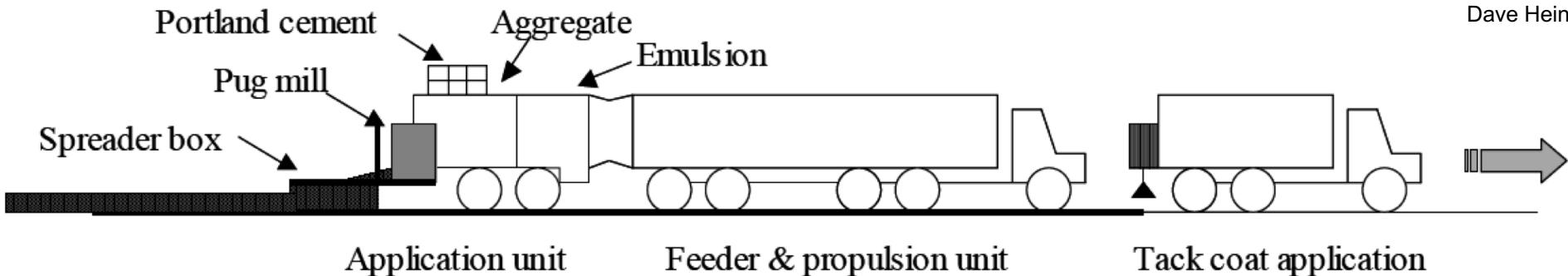


Microsurfacing

- Improve surface friction
- Reduce permeability
- Correct surface irregularities
- Prevent raveling



<http://www.genevarock.com/>





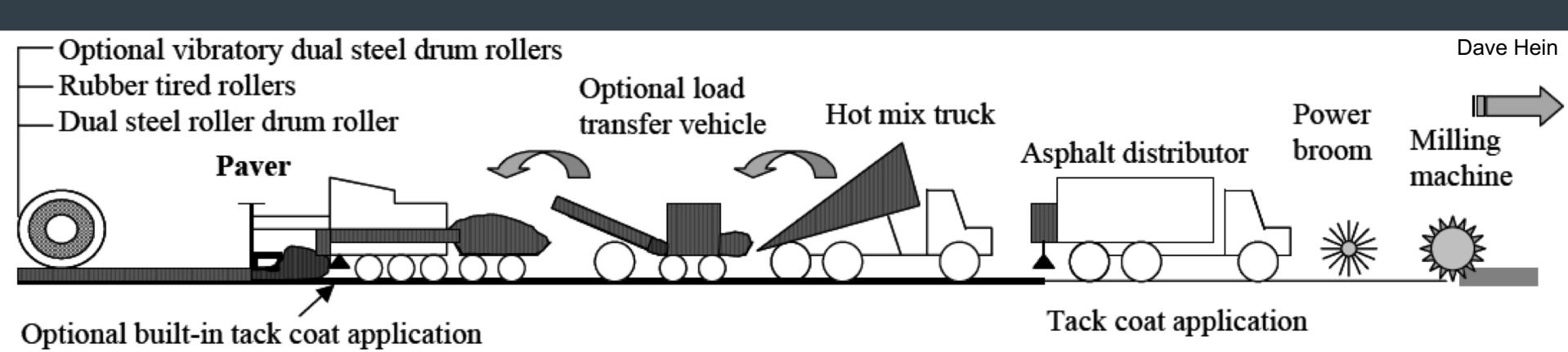
Thin Overlays

Less than 2 in. of hot mix asphalt (HMA).

- Improve surface friction
- Reduce permeability
- Correct surface irregularities



<http://www.pavementinteractive.org/>





Case Study: Database

- Design and Construction Information System (DCIS)
- 14,372 PM treatment projects from 1994 to 2015
- PM treatments: chip seal, microsurfacing and thin overlays
- Censored and uncensored data

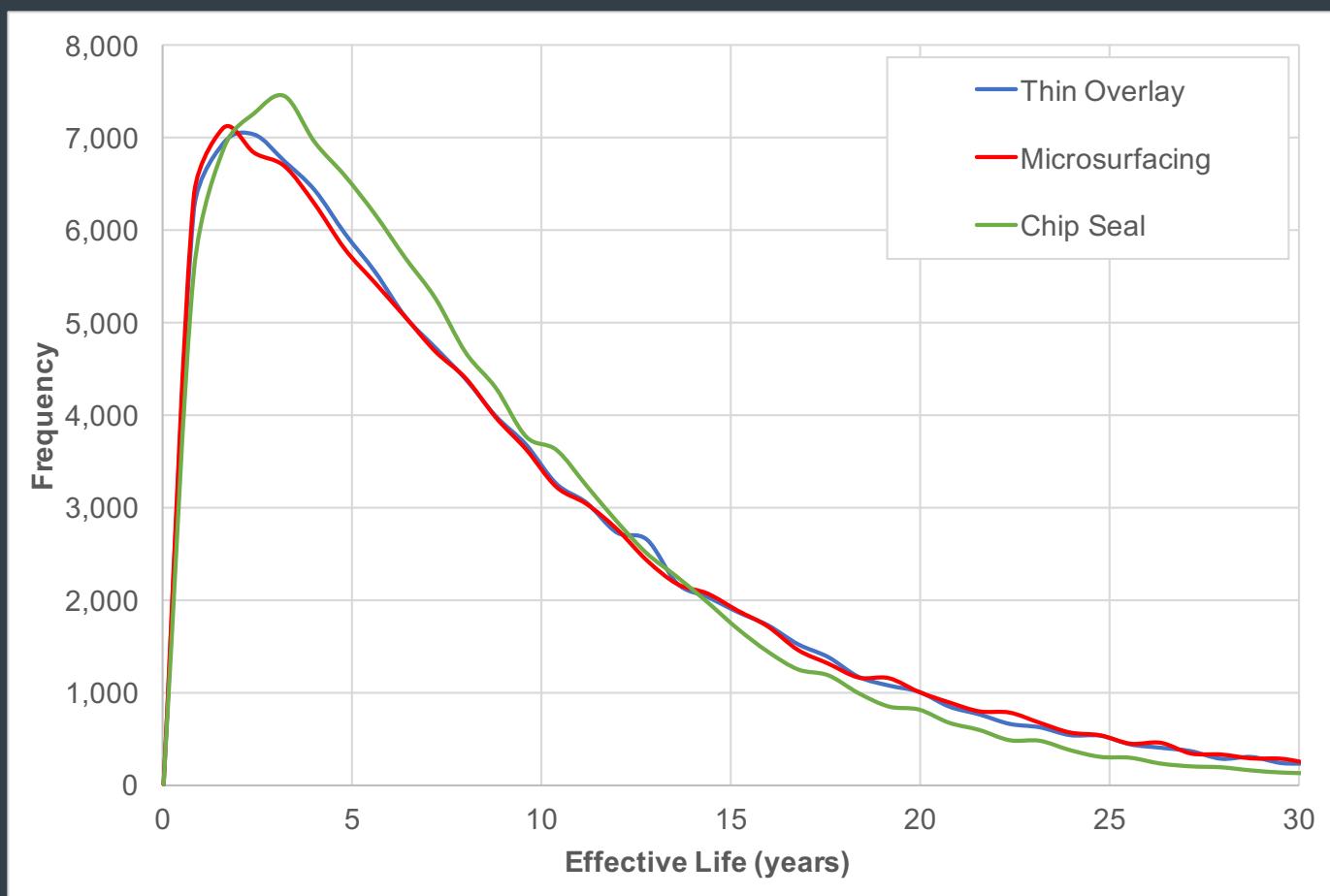
Traffic Information of Projects

- Pavement Management Information Systems (PMIS) Database



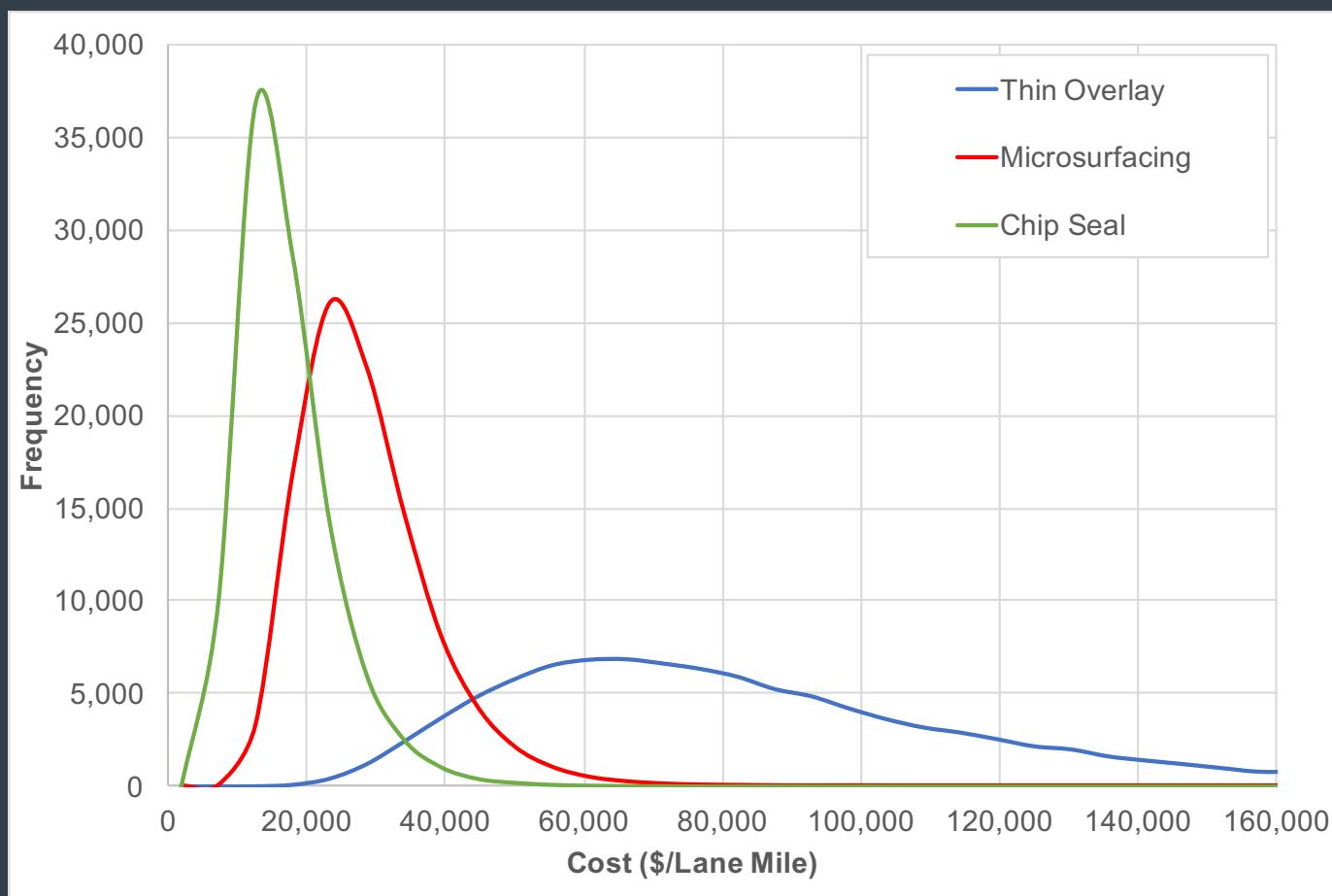
Case Study: Effective Life

Effective life: life between two consecutive treatments applications.



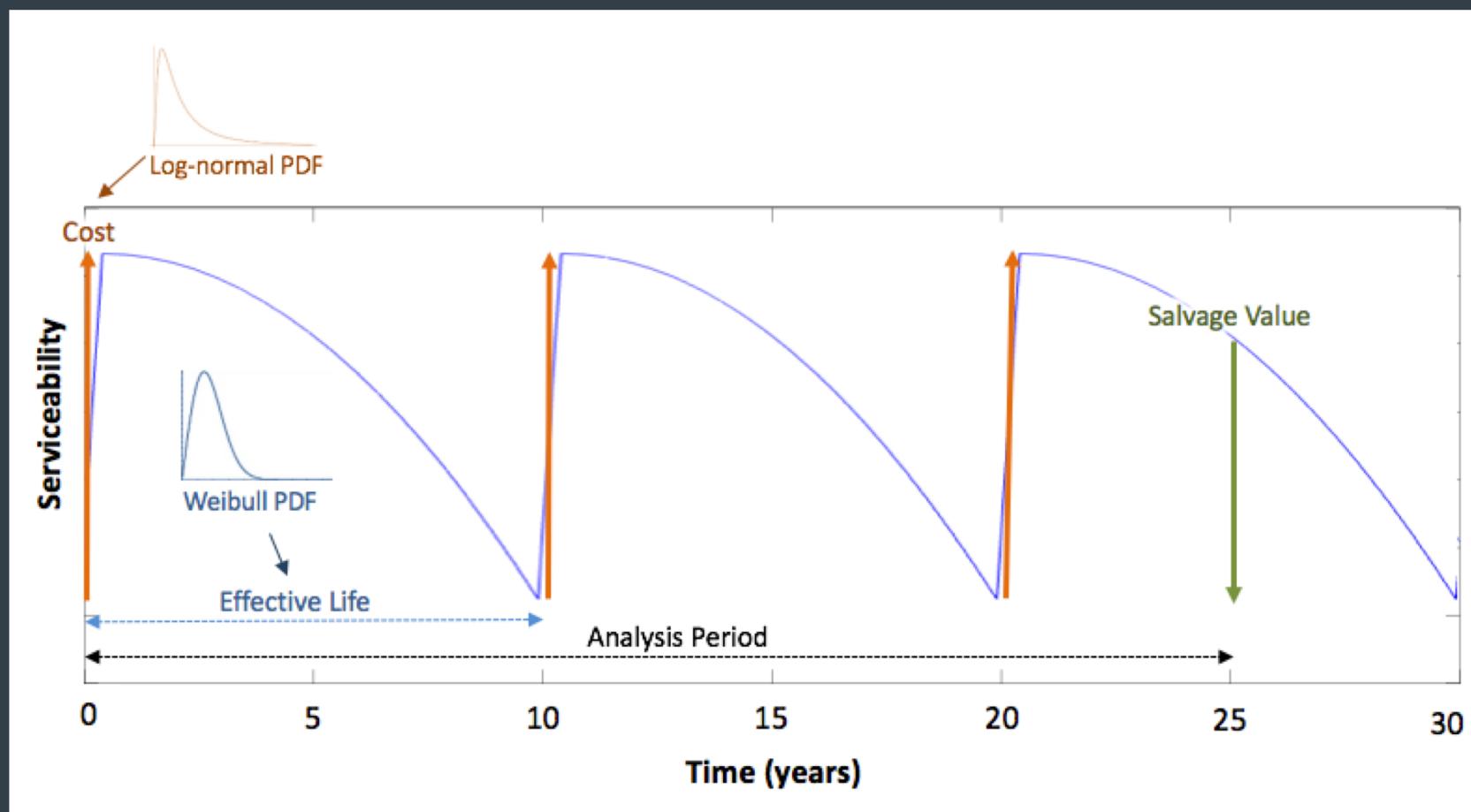


Case Study: Cost



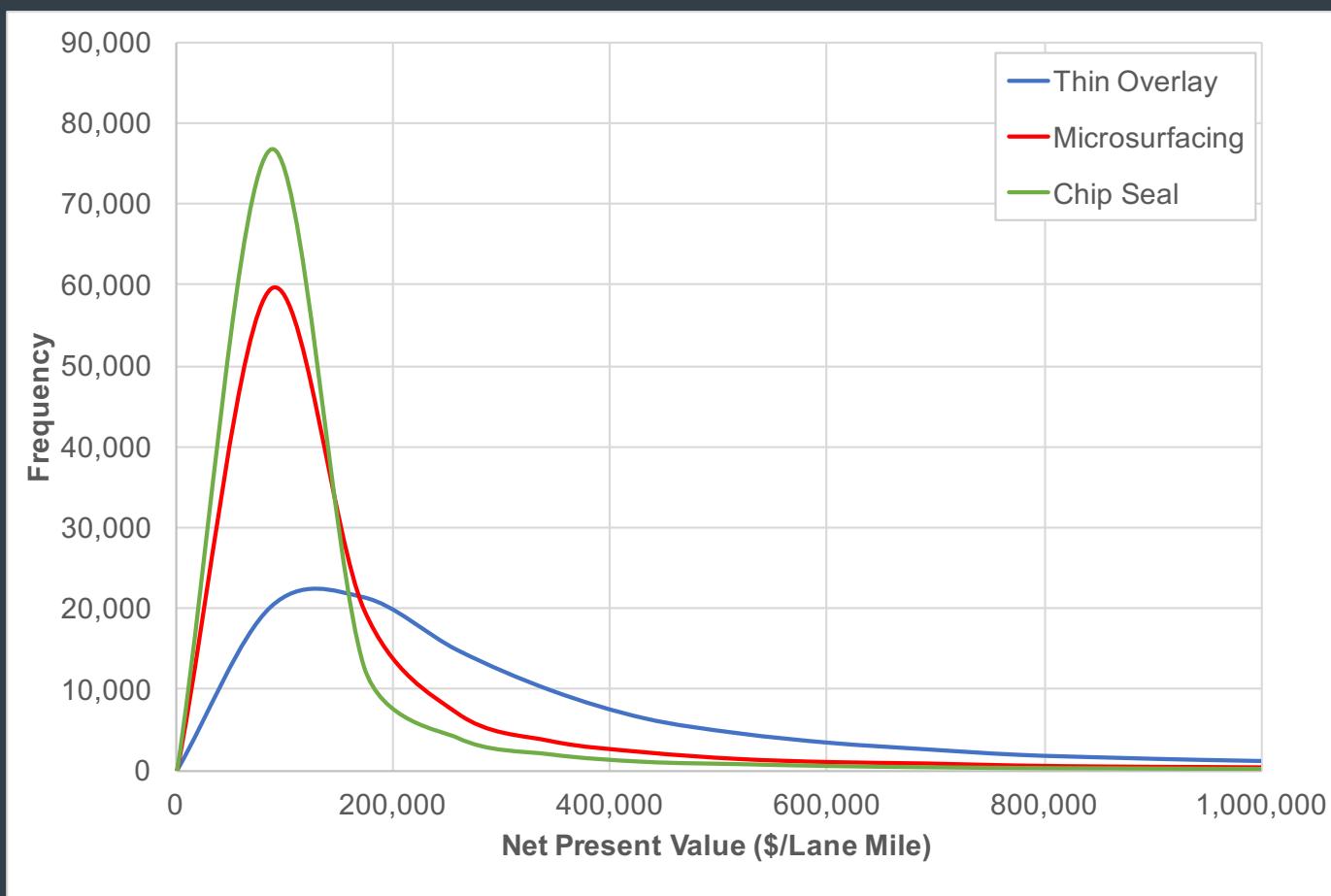
Life-Cycle Cost Analysis

- Consecutive application of PM treatment
- Probabilistic approach: net present value





Life-Cycle Cost Analysis





Cost Probabilities

Probability that	is more cost-effective than	(%)
Chip Seal	Microsurfacing	70
Chip Seal	Thin Overlay	85
Microsurfacing	Thin Overlay	75

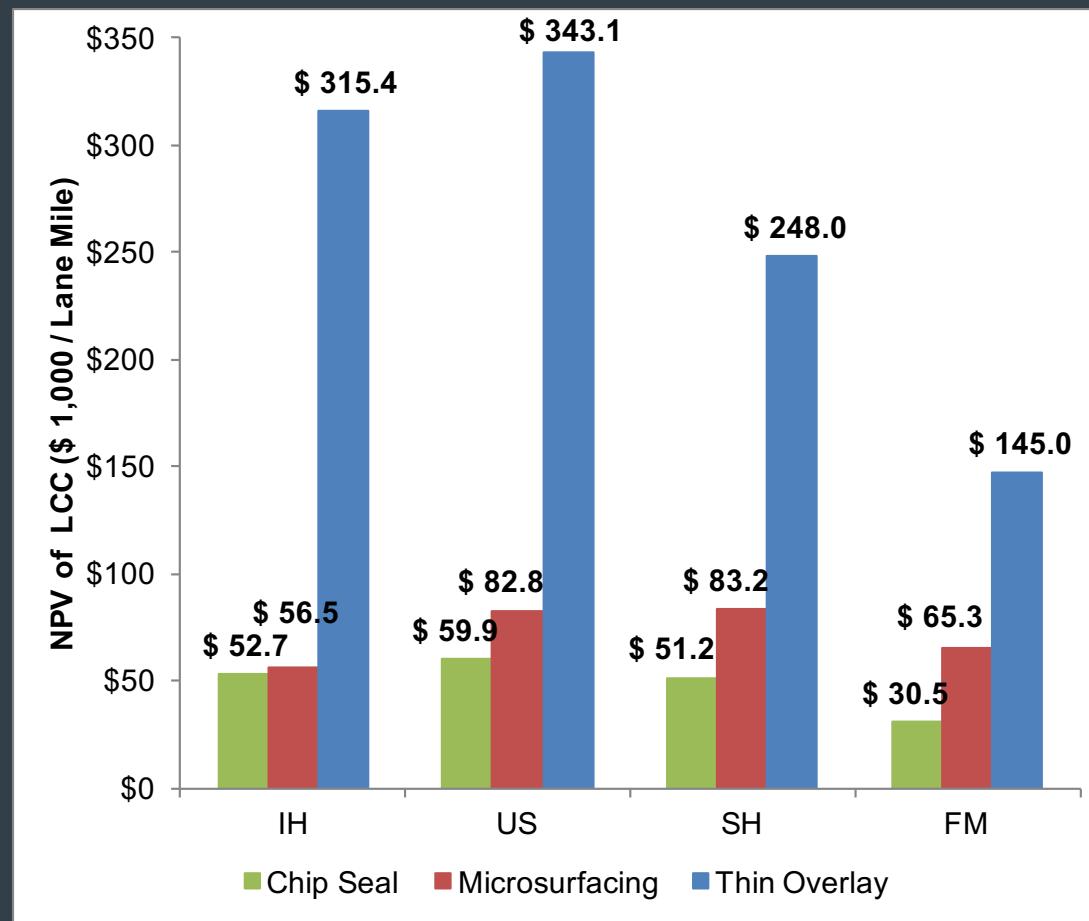


Life-Cycle Cost Analysis

- Facility type:
 - Interstate Highways (IH)
 - US Highways (US)
 - State Highways (SH)
 - Farm to Market Highways (FM)
- Traffic volume: Annual Average Daily Traffic (AADT)
- Traffic load: Equivalent Single Axle Load (ESAL)

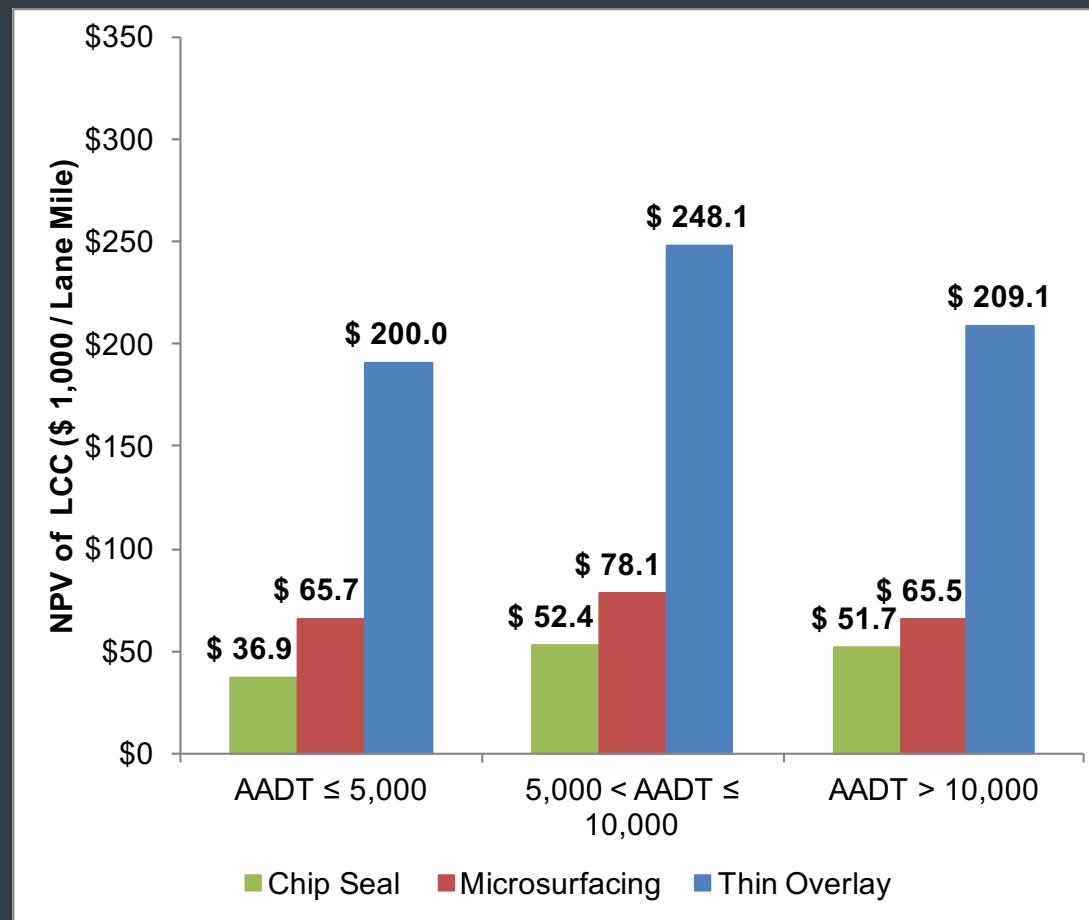


Effect of Facility Type



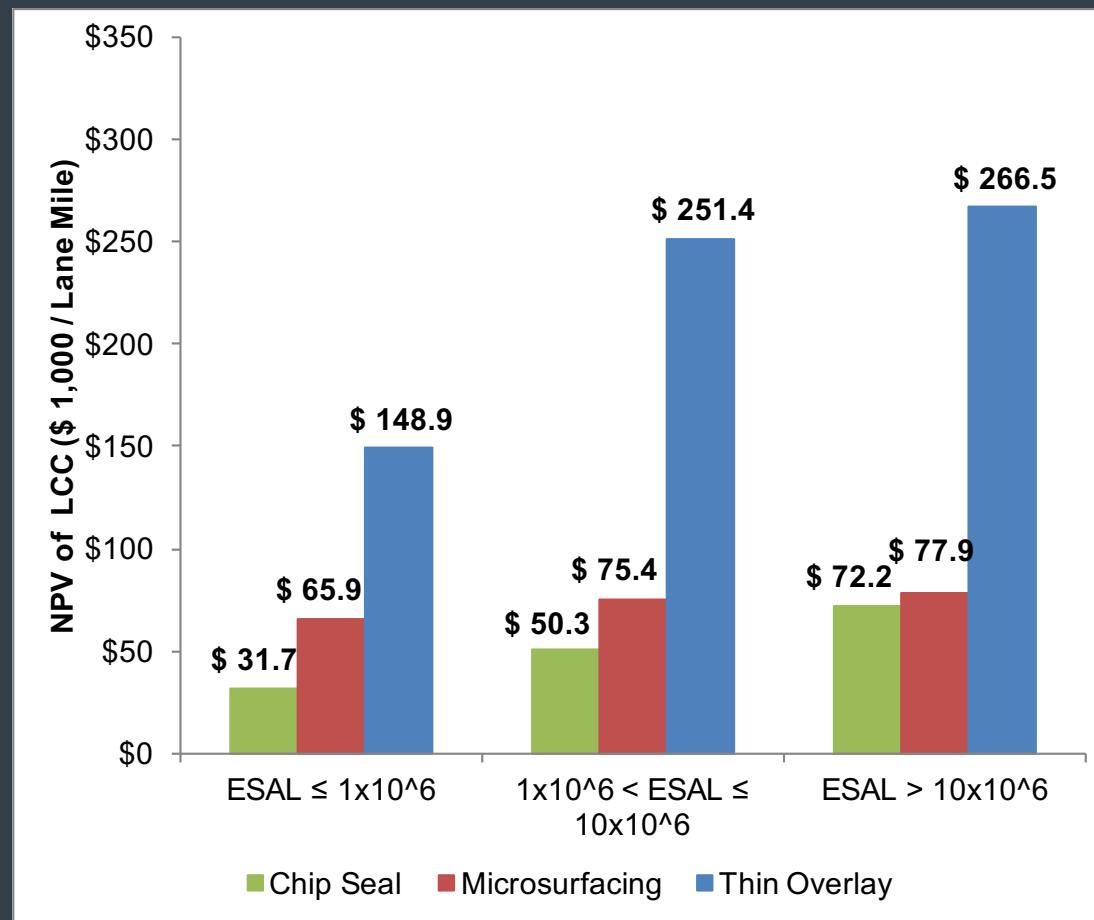


Effect of Traffic Volume





Effect of Traffic Loads





Conclusions

- Based on actual data
- Chip Seal emerges as most cost-effective PM treatment
- Microsurfacing for higher traffic volumes
- Thin overlay use evaluated in a case-by-case basis
- Include other variables such as climate, district practices, materials type and pavement condition



Thank you!

Any questions?

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