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

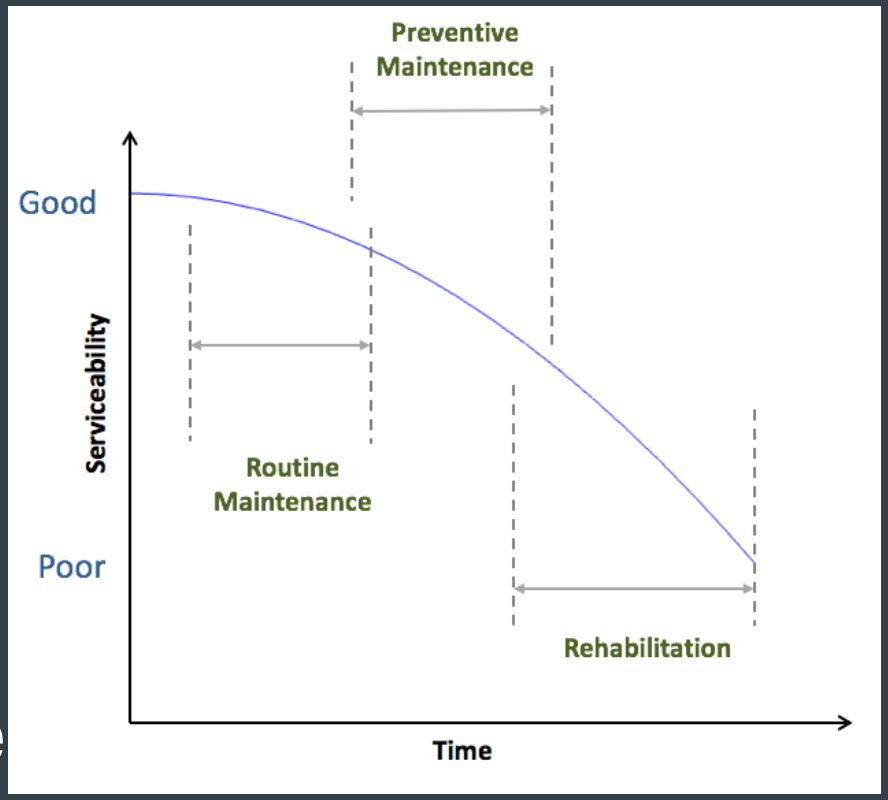
Assumptions

- 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

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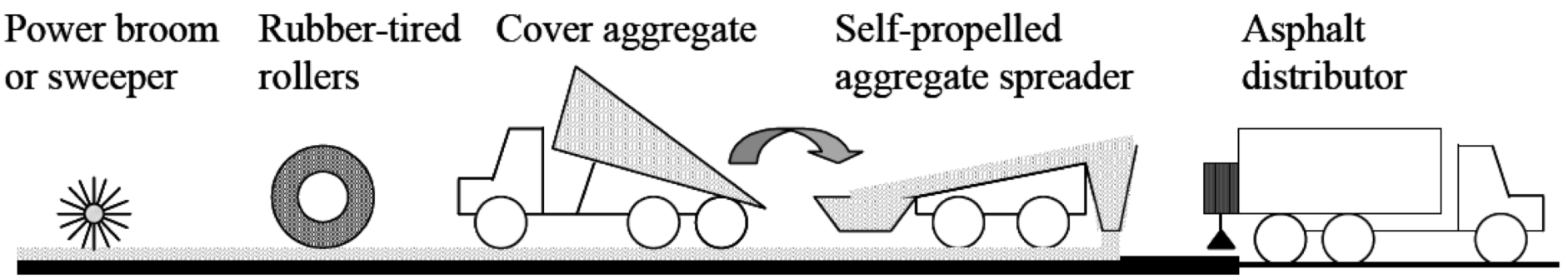

Microsurfacing

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


http://www.genevarock.com/

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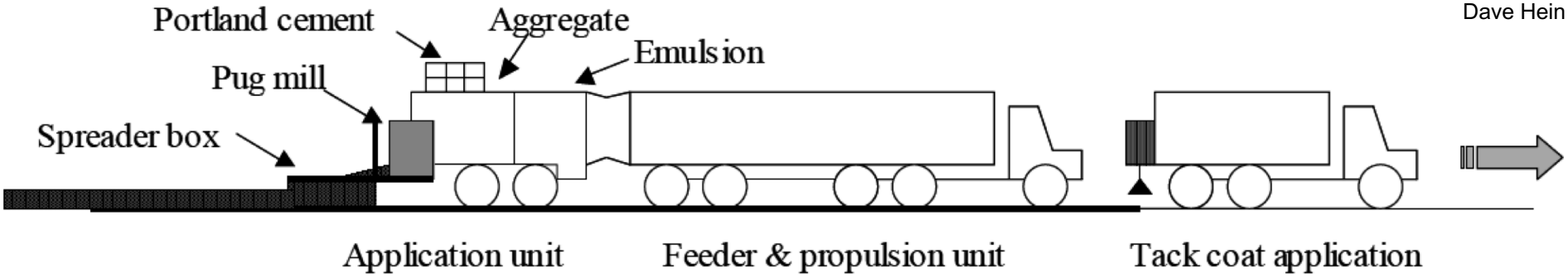

Thin Overlays

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

- Improve surface friction
- Reduce permeability
- Correct surface irregularities

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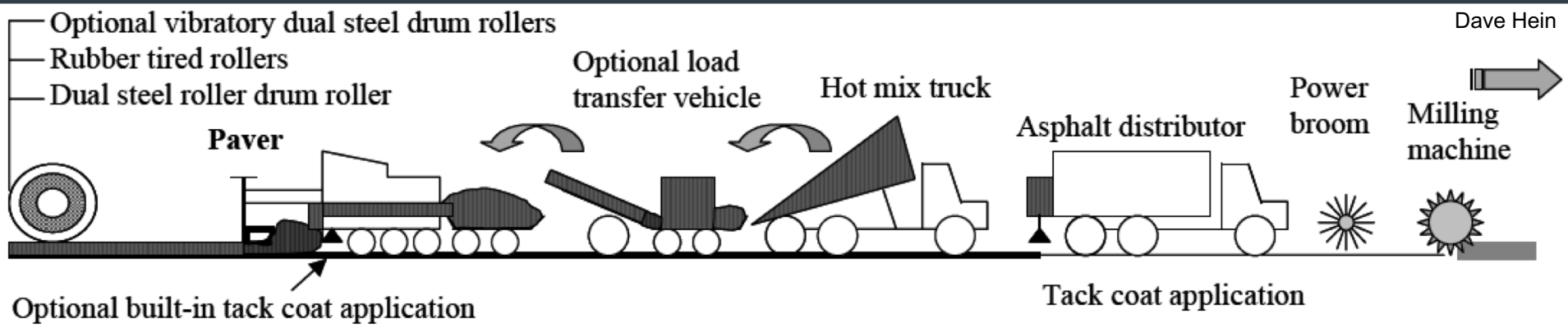


Case Study: Database

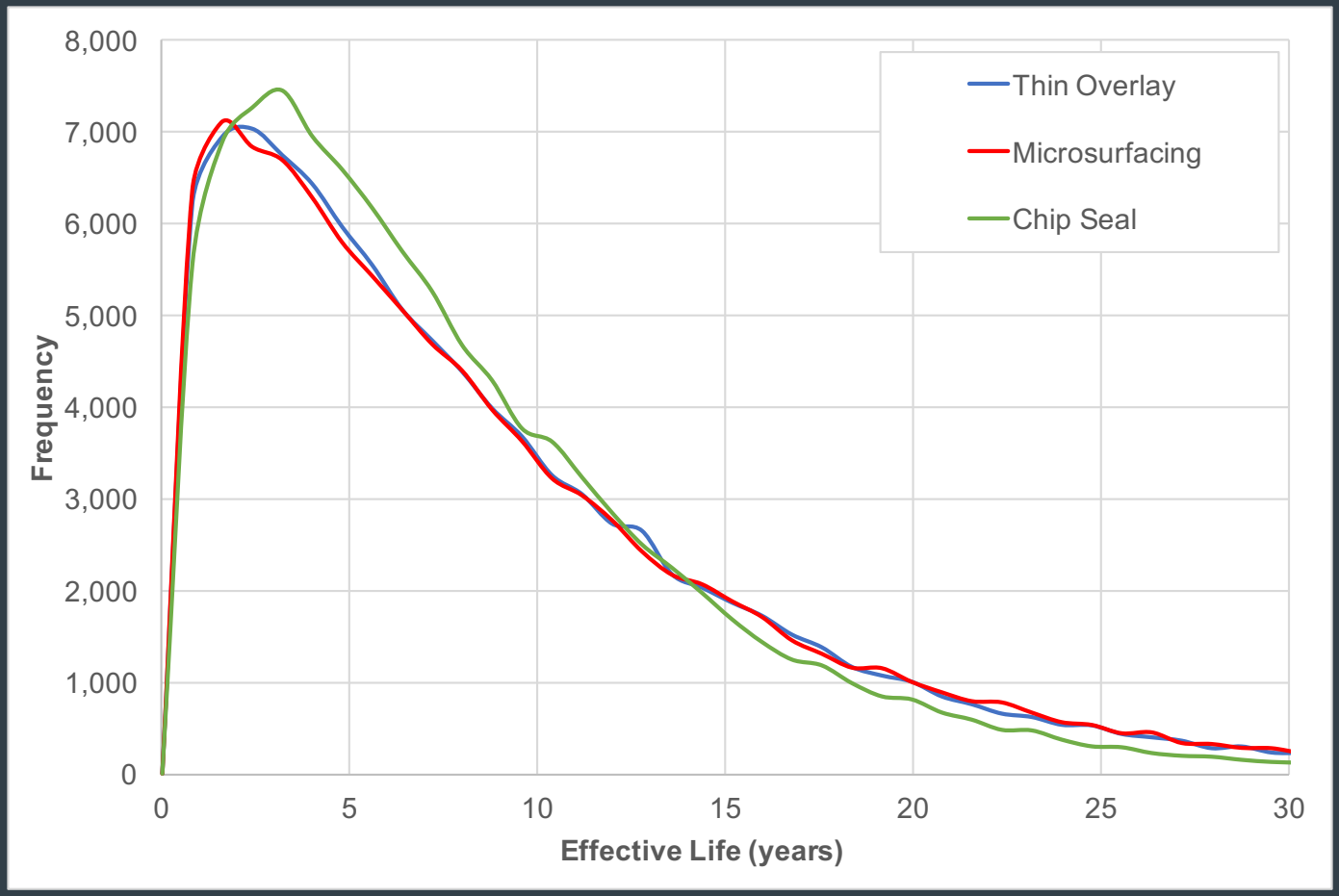
- Design and Construction Information System (DCIS)
- 14,372 PM treatment projects from 1994 to 2015
- PM treatments: chip seal, microsurfacing and thin overlays
- Censored and uncensored data

Traffic Information of Projects

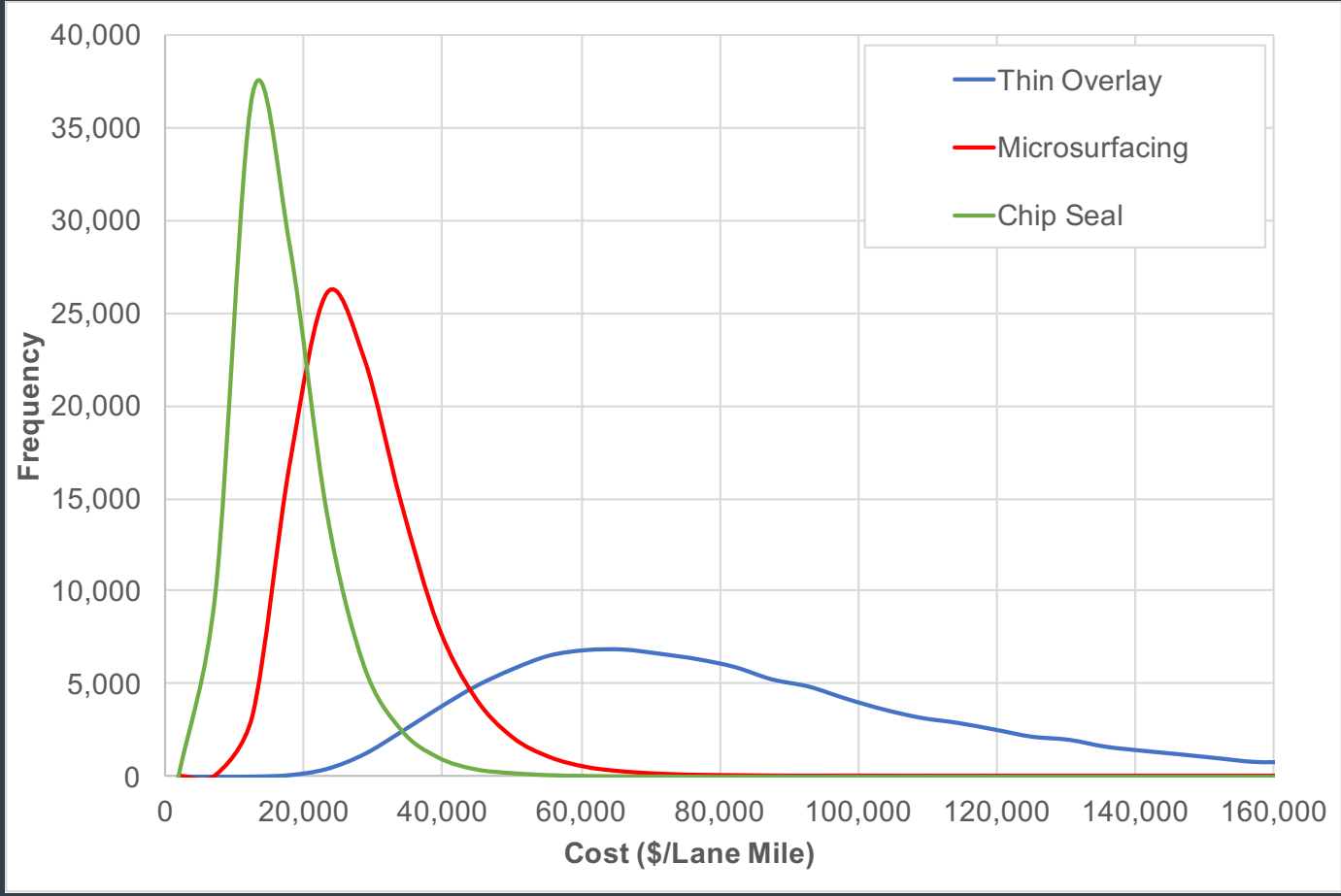
- Pavement Management Information Systems (PMIS) Database

Case Study: Effective Life

Effective life: life between two consecutive treatments applications.

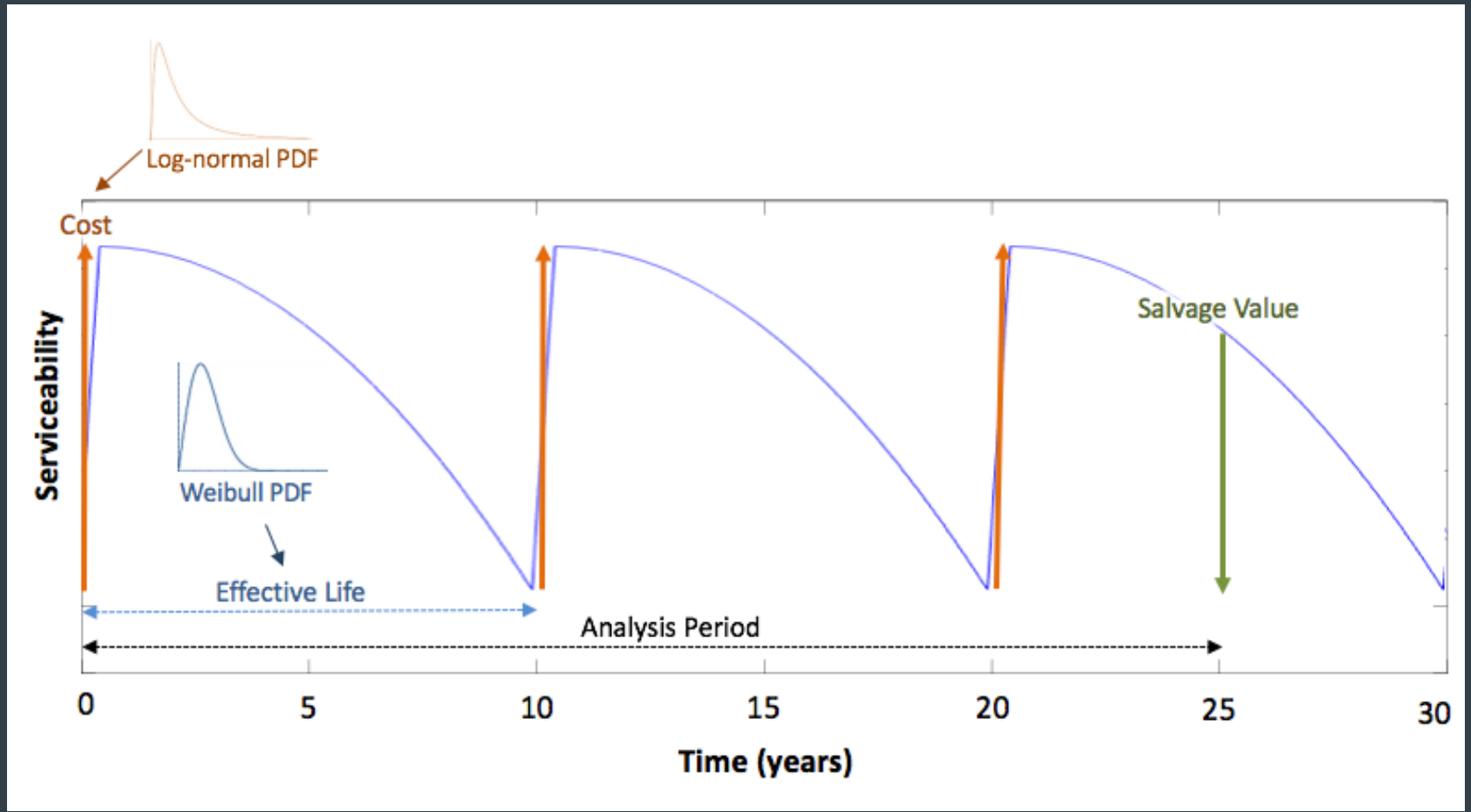


Case Study: Cost

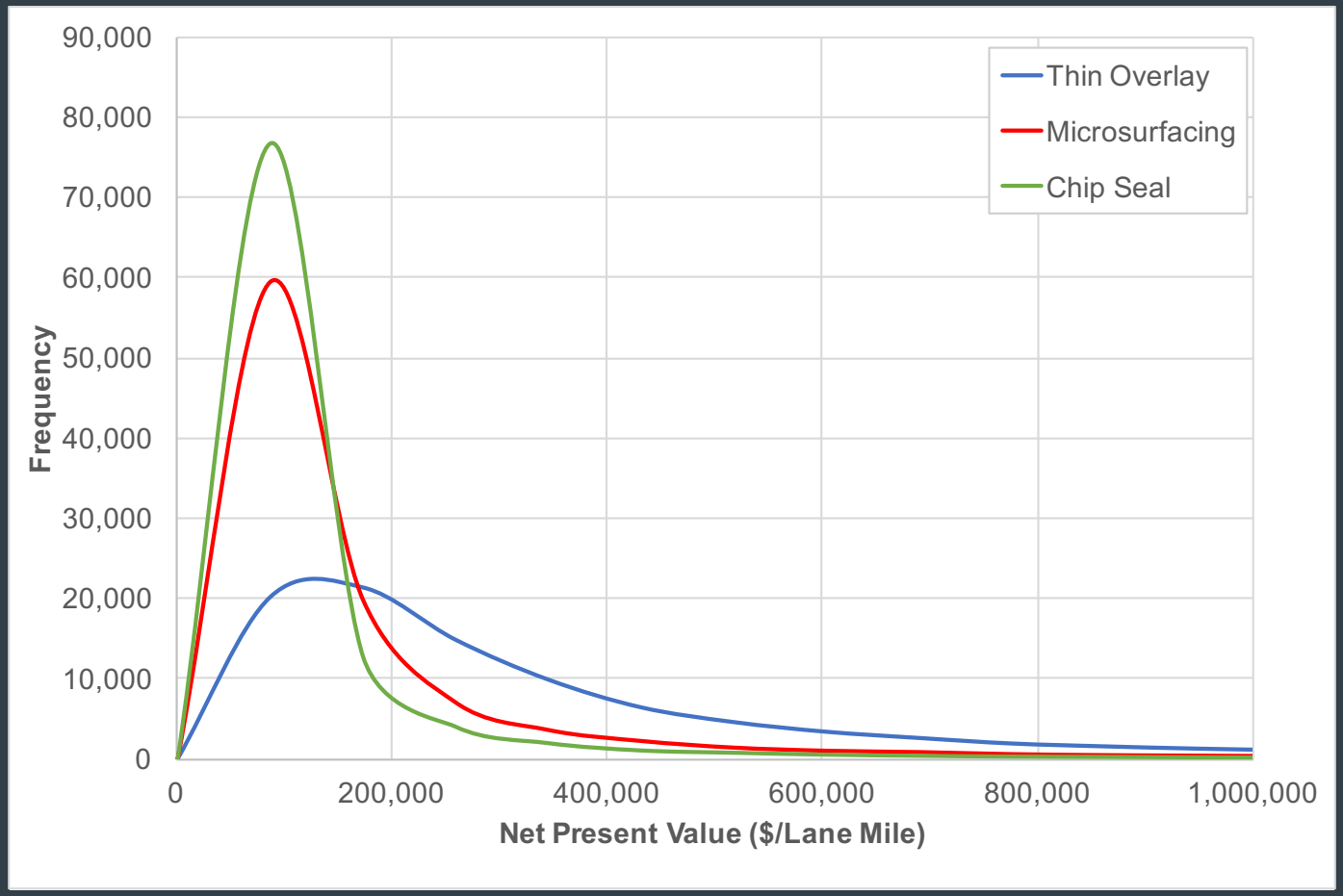


Life-Cycle Cost Analysis

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



Life-Cycle Cost Analysis



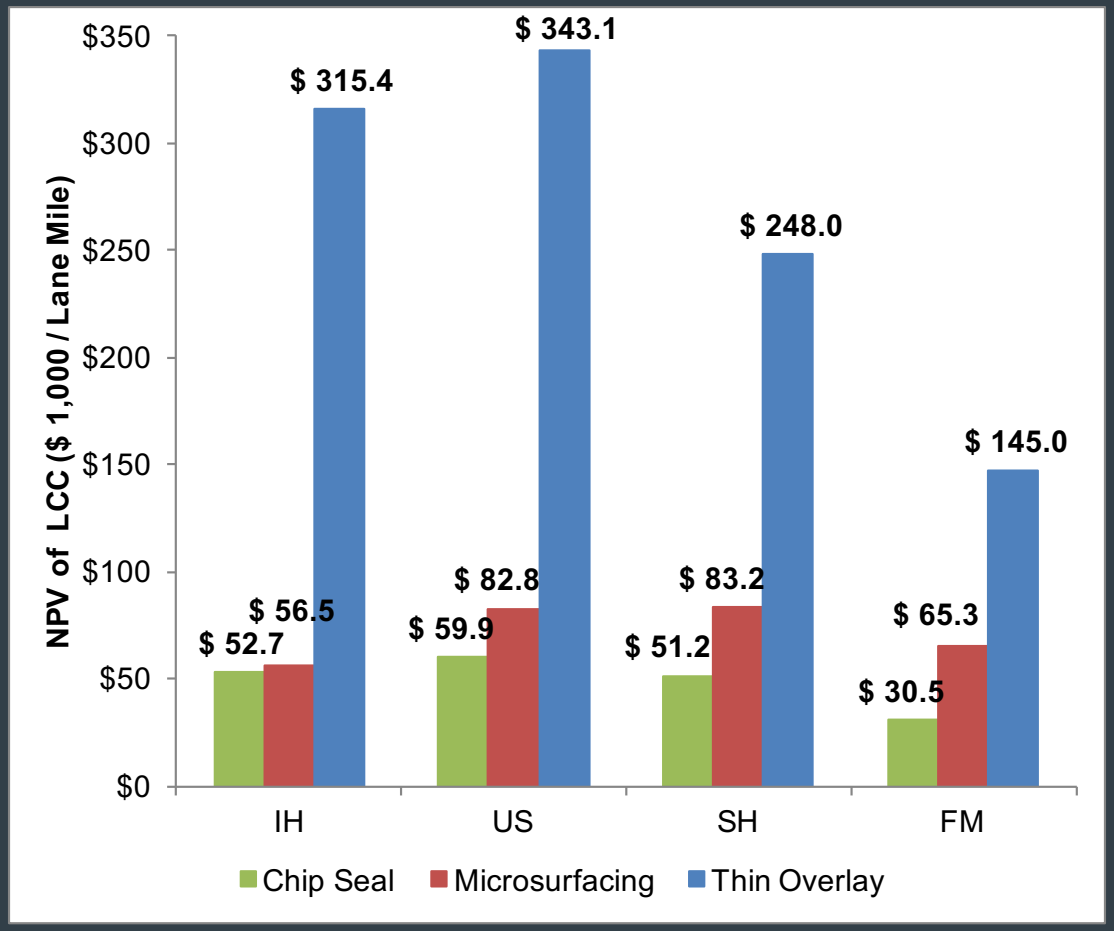
Cost Probabilities

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

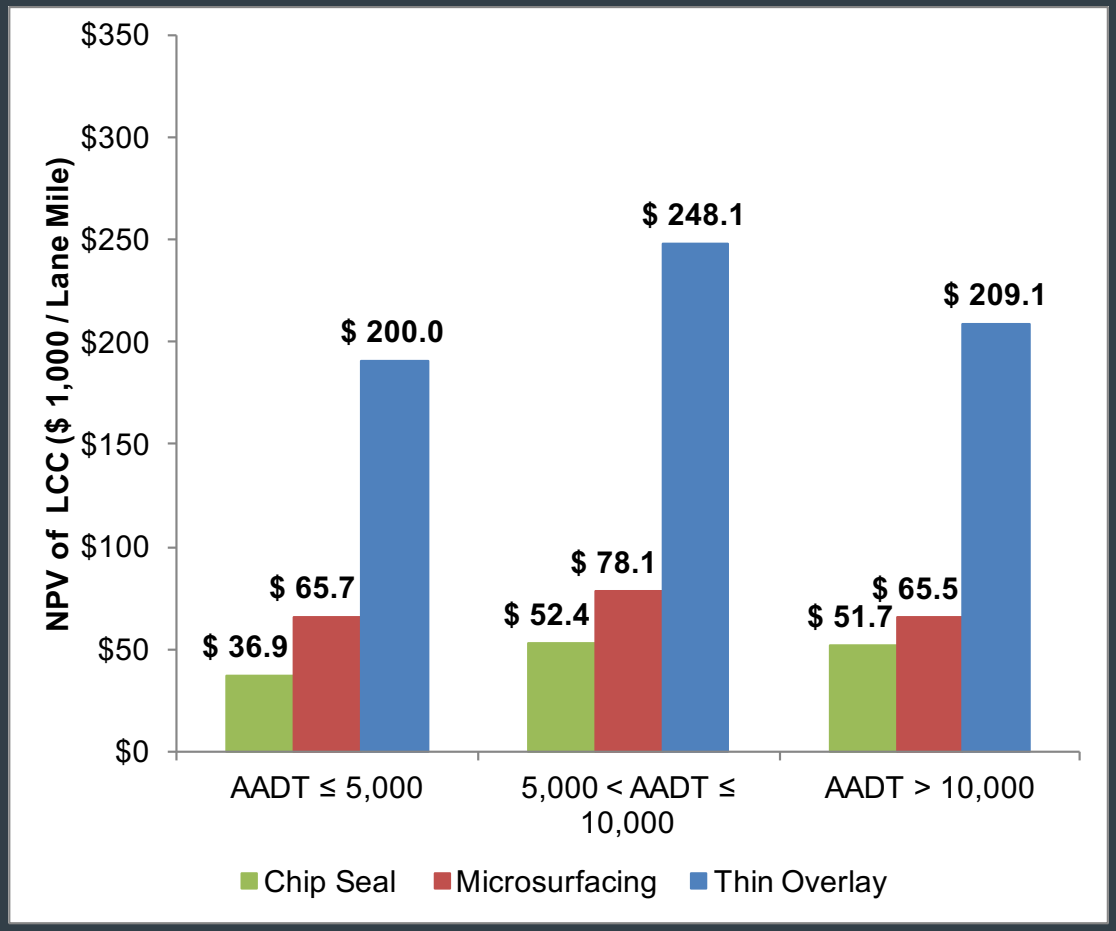
Life-Cycle Cost Analysis

- 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)

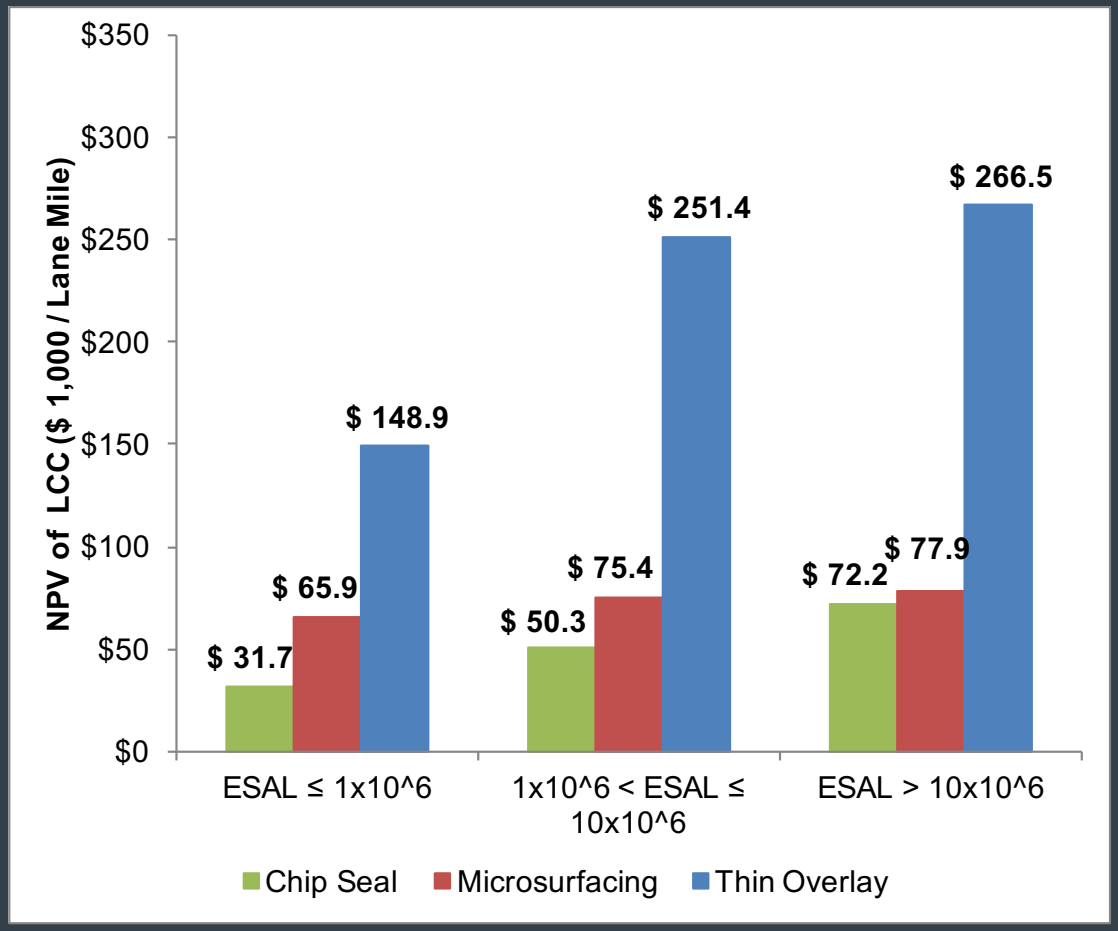
Effect of Facility Type



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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