AgileAssets' Performance Models

Jim Edgerton
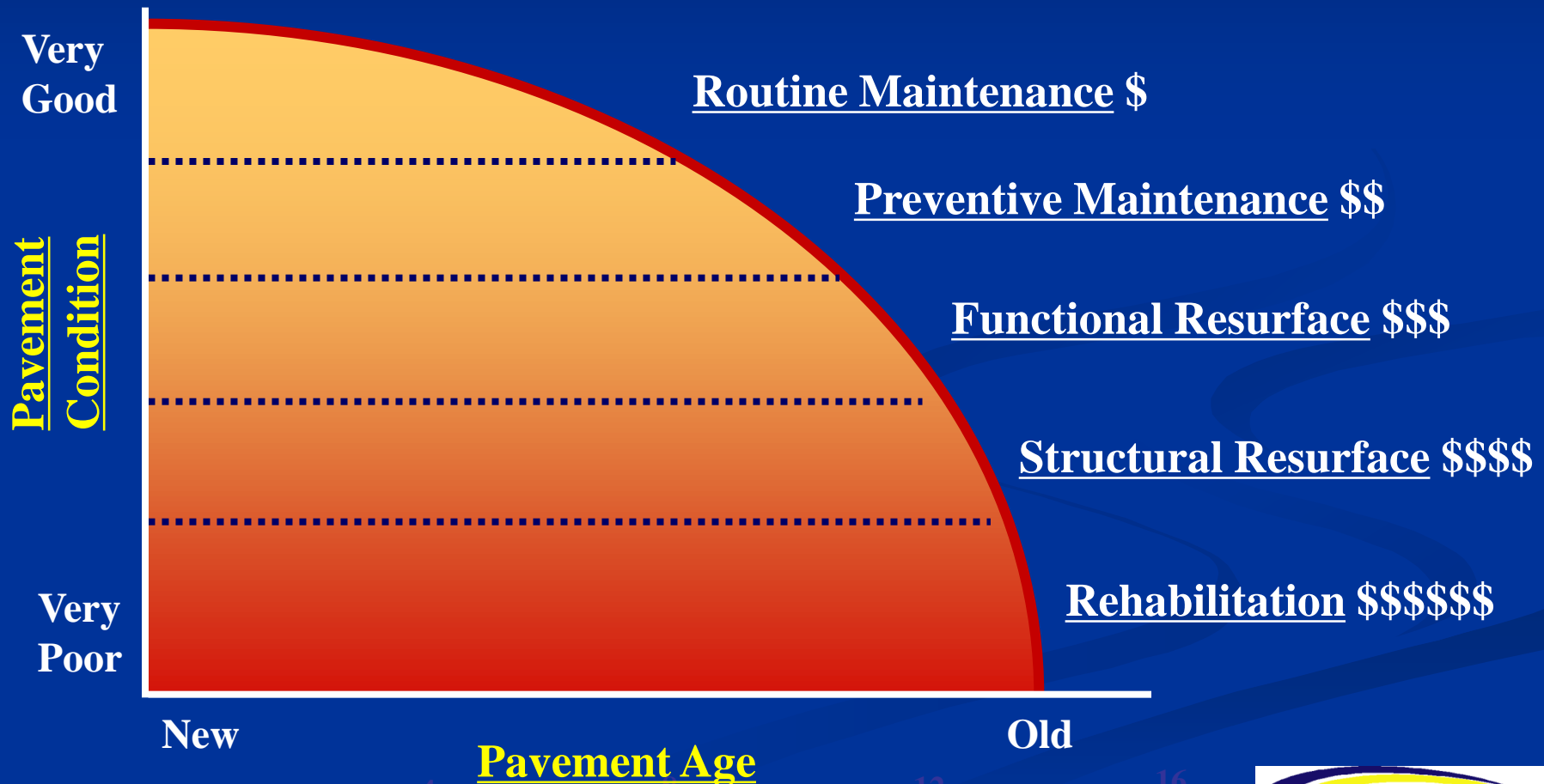
Director of Technical Sales

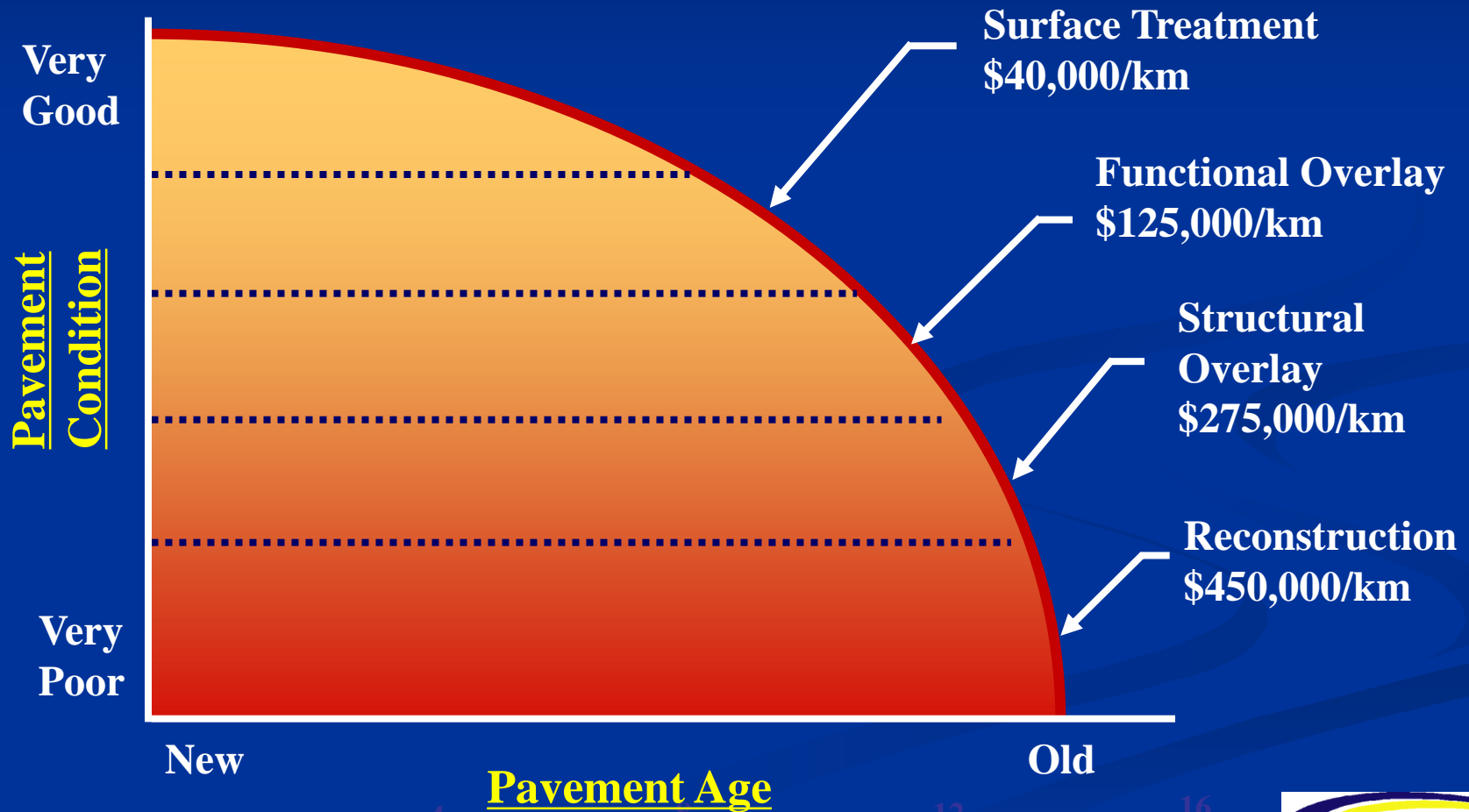**November 10, 2011**

Pavement Preservation

The Importance of Timing

Cost of Delaying Maintenance

Cost of Delaying Maintenance

Very Good

Pavement Condition

Very Poor

New

Old

Pavement Age

Surface Treatment
$40,000/km

Functional Overlay
$125,000/km

Structural Overlay
$275,000/km

Reconstruction
$450,000/km

4   8   12   16

AgileAssets

AgileAssets Pavement Manager

- Very Flexible – Simple or Complex

- Highly Configurable

  - System configured to the way you do business

- Multi-Constraint Optimization

- Robust Reporting Tools

- Integrated with other Assets

"Unlimited" Analysis

- Unlimited Decision Trees

- Unlimited Pavement Types

  - Thick Pavements vs. Thin Pavements

  - High Traffic vs. Low Traffic

  - GABC Base vs. Recycled Base vs. Reclaimed Base

  - Hot Mix w/ Micro-Surfacing vs. No Micro-surfacing

  - Allow for Different Treatments by Classification, Curb/No Curb, etc.

- **Unlimited Performance Models**
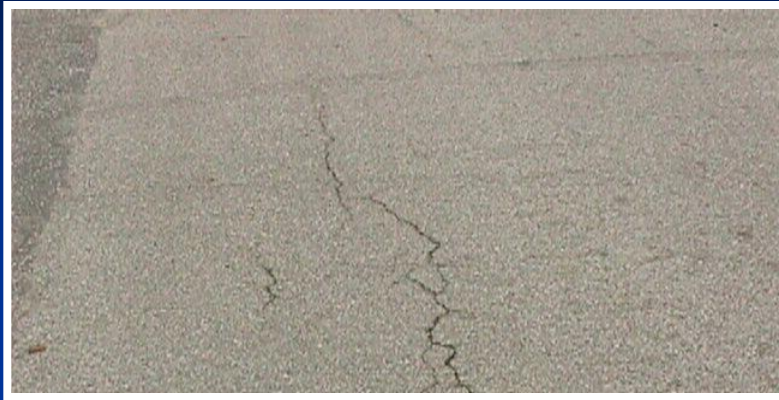
"Unlimited" Analysis

- Unlimited Decision Trees

**Analysis Capabilities
are Data-dependent**

**Available Data will limit what can be
analyzed**

- **Unique Performance Models**

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Condition vs. Strategy

Routine - Crack Seal (?)

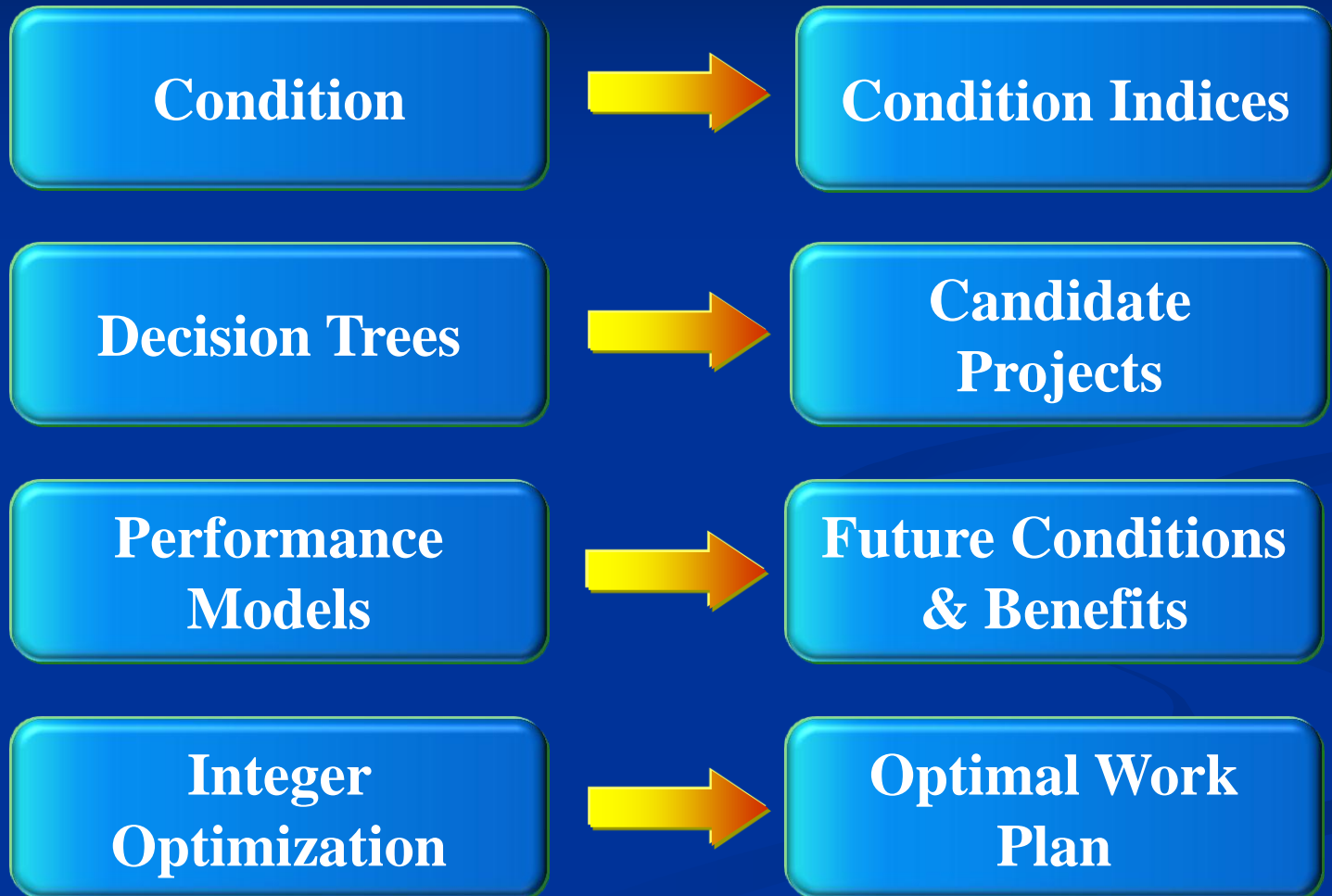**Routine - Patching**

Resurface

Reconstruction

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Multi-Constraint Analysis

Multiple Year Analysis utilizing:

- Decision Trees

- Performance Models

- Optimization Analysis (Solver)

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Network Optimization Approach

Condition	→	**Condition Indices**
Decision Trees	→	**Candidate Projects**
Performance Models	→	**Future Conditions & Benefits**
Integer Optimization	→	**Optimal Work Plan**

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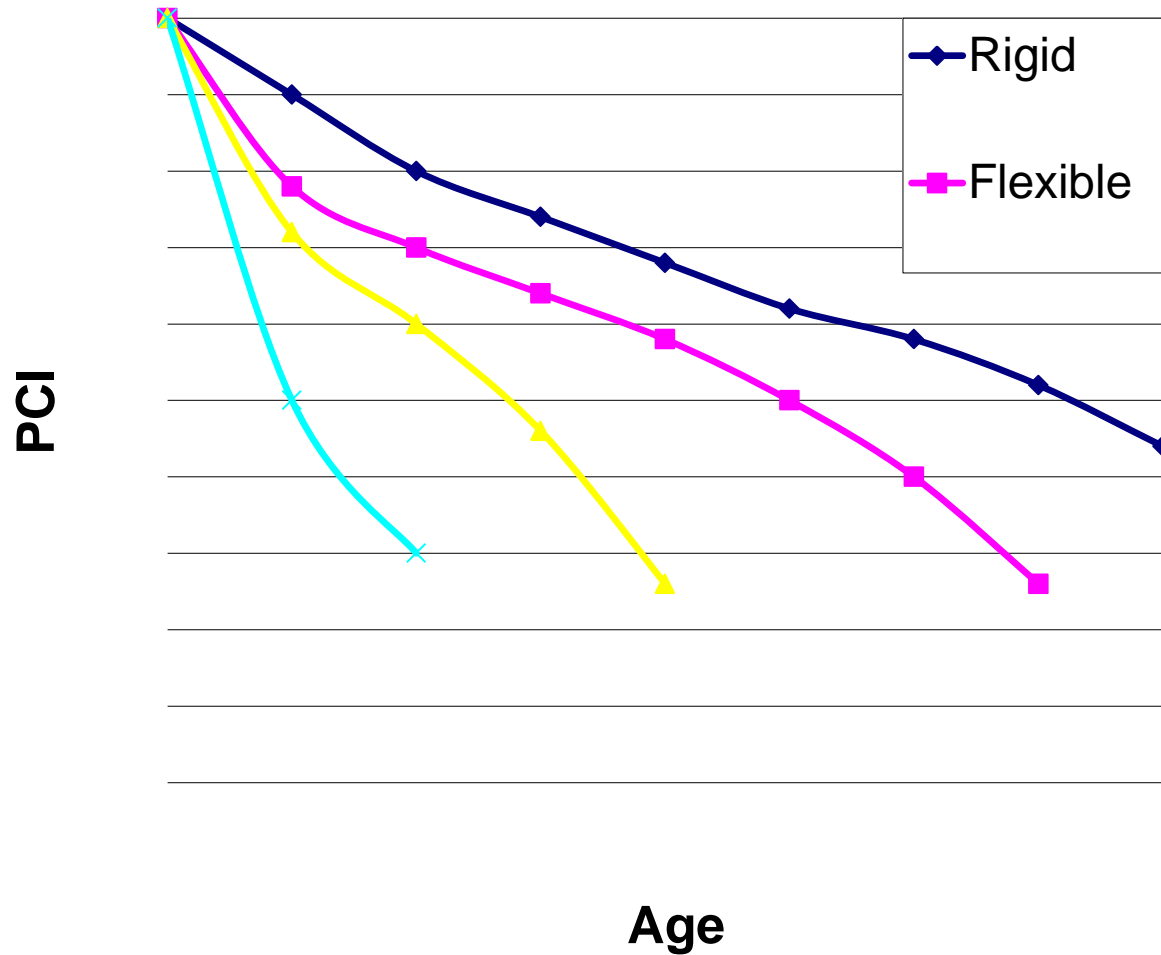# Performance Models

- Used to Predict Future Performance

  - Long-term Consequence Analysis

- Used to Determine "Benefit" of a Treatment

  - Area Under The Curve

  - Modify w/ Available Factors

    - ADT, ESAL's, Classifications, Enviro-Friendly Factors, etc.

- Complexity of Models

  - Level of Available Detail

    - Single Condition Index vs. Multiple Indices

Performance Modeling

- Deterministic Models

  - Expert opinion

  - Statistical Analysis

- Markov Chain (Transition Probability Matrix)

  - Although available, it is typically not used

- Dynamic Modeling

  - Models will adjust to latest condition data
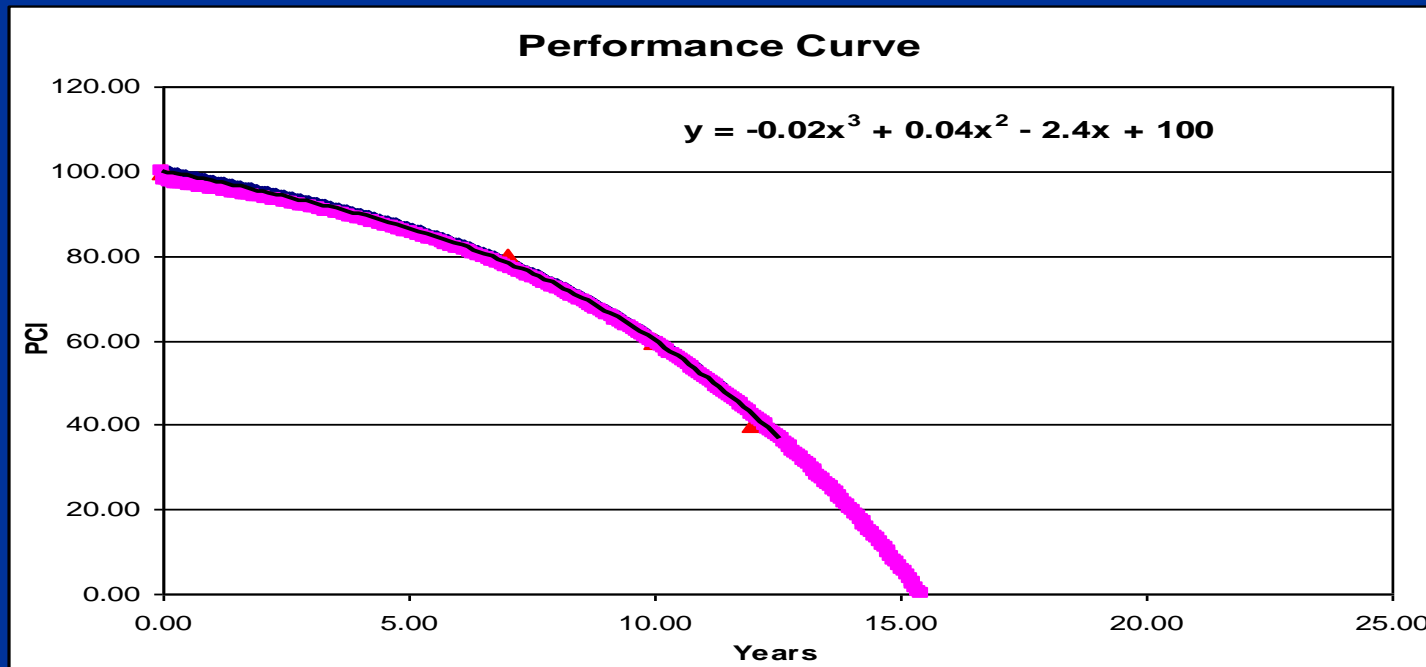
Example – State DOT w/ 4 Curves

Performance Models
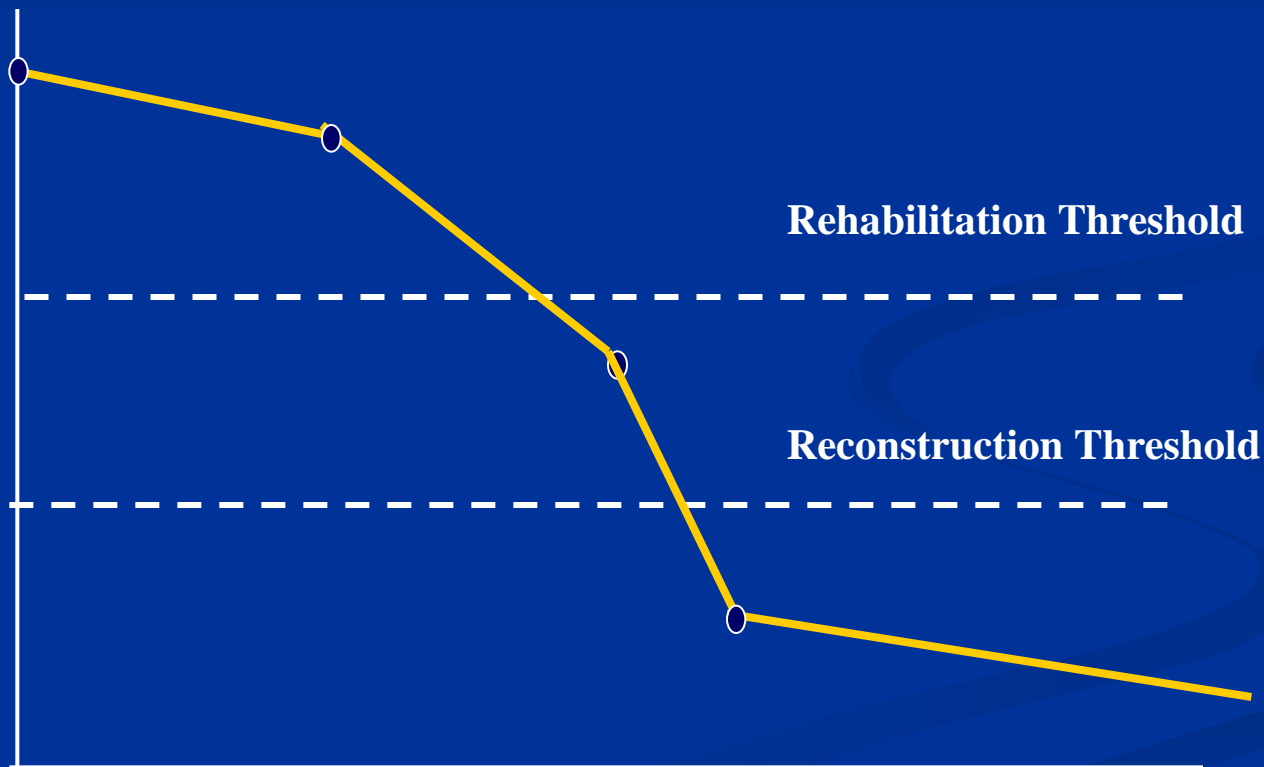
- Equation Builders

  - Internal

    - Pavement Management Software

  - External

Performance Curve

$$y = -0.02x^3 + 0.04x^2 - 2.4x + 100$$

Performance Models

- Example: Enter up to 10 Points
  - User-specified Points (PCI vs. AGE)

Rehabilitation Threshold

Reconstruction Threshold

Decision/Performance Models

- Understand "Reality"

- Fully consider all factors

  - Accurate Ages

  - Pavement Structure

  - Composite Index or an Individual Index

    - If Composite includes IRI

      - Micro or Slurry on a road will affect IRI Index

- Don't Let Perfect get in the Way of Pretty Good

  - Do you meet your objectives?

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Additional Flexibility

- Reset Values (After a Treatment is Applied)

  - Fixed Value

    - Recon: $PCI_{New} = 100$

  - Increase by "X"

    - Surface Coat: $PCI_{New} = PCI_{Old} + 15$

  - Equation

    - Overlay: $PCI_{New} = PCI_{Old} + 50(PCI_{Old}/100)^{0.85}$

- Curve Families

  - Change Curve after treatment

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Summary

Questions?

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