

Report from PMS Breakout Session

Chad Shive

KYTC/Division of Operations

Pavement Management

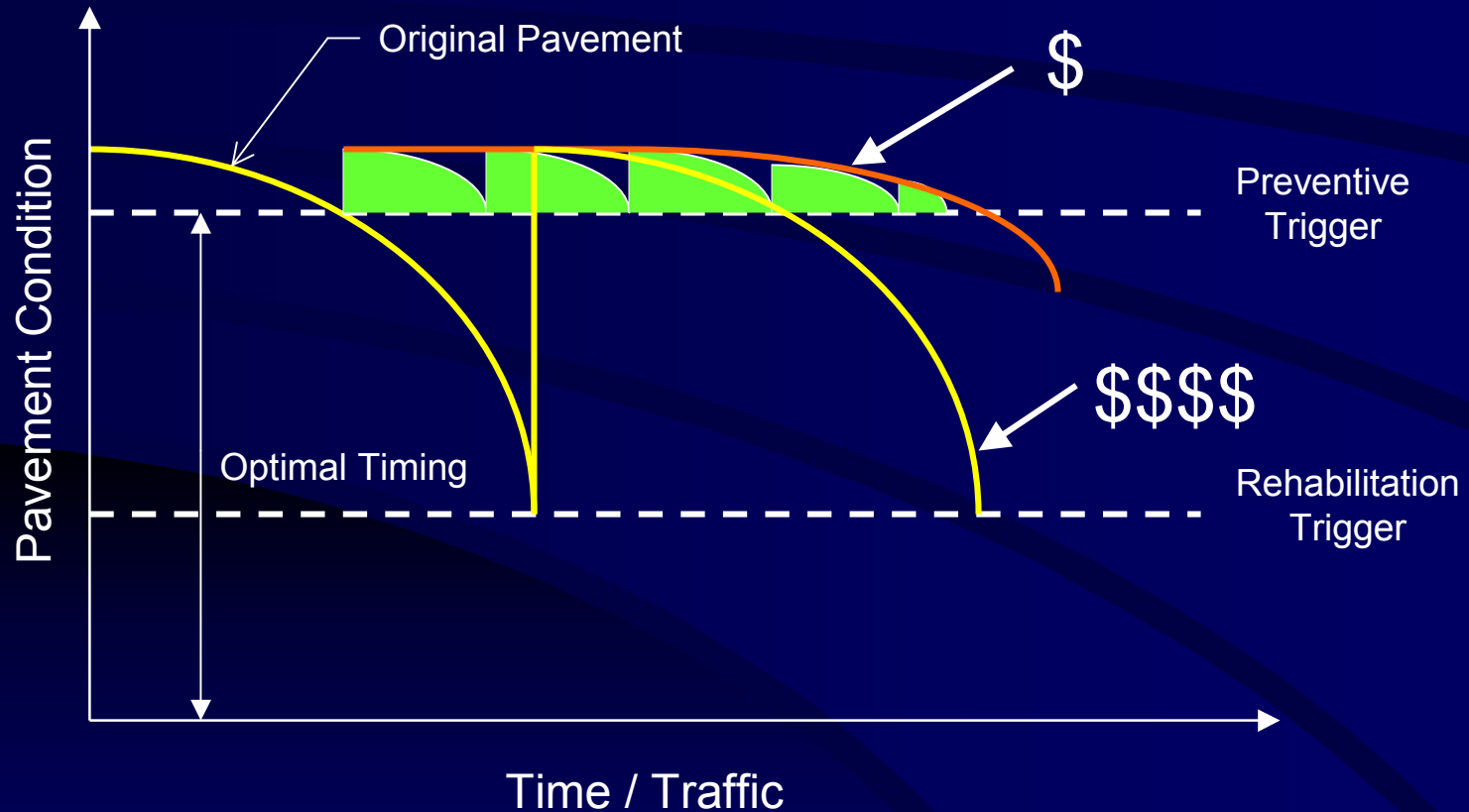
Luis Rodriguez

Pavement Preservation in the USA

- What is Pavement Preservation?
 - Preventive Maintenance
 - Minor Rehabilitation
 - Routine Maintenance

Preventive Maintenance - A planned strategy of cost effective treatments to an existing roadway system and its appurtenances that preserve the system, retards future deterioration and maintains or improves the functional condition of the system (without substantially increasing structural capacity).

Concept of Pavement Preservation (P²)



NHI Course Listing

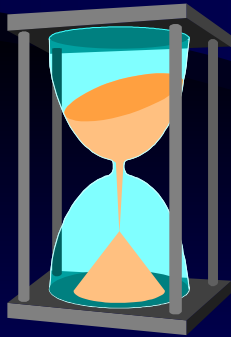
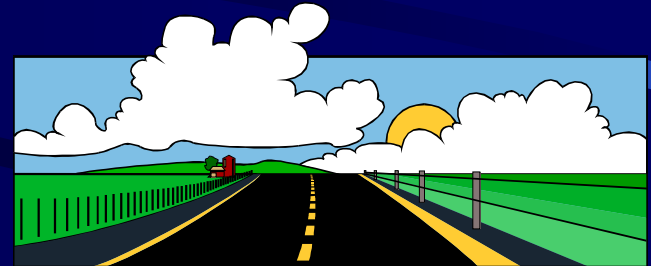
- “The Preventive Maintenance Concept” NHI Course #130154
- “Selecting Pavements for PM” NHI Course #130158
- “Design and Construction of Quality PM Treatments” – *Winter 03/04*
- “Integrating PM into Pavement Management Systems” – *Winter 03/04*

Philosophy of Preventive Maintenance



Applying the right treatment

... To the right pavement



... At the right time

Robert Paine, P.E.

Practical Examples of Combining Maintenance and Rehabilitation Activities in a PMS Analysis

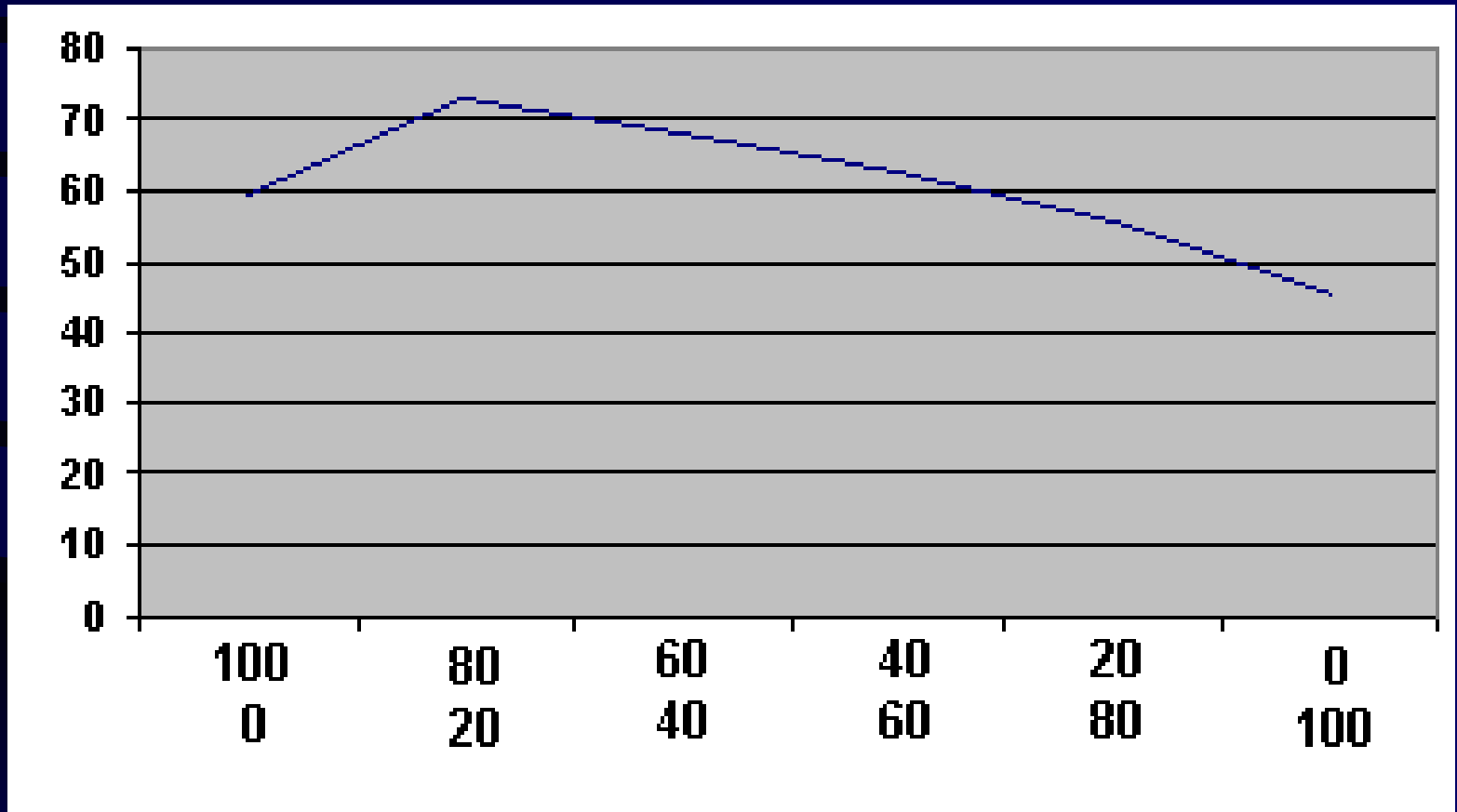
- Rehabilitation - Major treatment that has the effect of resetting many indexes to their original value.
- Maintenance - More minor treatment that has the effect of resetting some indexes slightly or not at all.
- Treatment - A single action taken by an agency to slow deterioration down or repair the effects of deterioration.
- Treatment Strategy - A course of action to be taken over the analysis period and consists of one or more treatments.

Steps in an Analysis

- Transform data to indexes,
- Transform indexes to analysis sections,
- Apply performance expressions to current index values (Do-nothing),
- Decision logic triggers treatments and creates several treatment strategies for every analysis section,
- Budget scenarios are defined,
- Optimization used to select the best strategy to satisfy an objective function for the network.

What is the Best Budget Split?

Resulting PCI



Percent Budget Split

Joe Kindler, P.E.

Economical Ideas and Common Sense

- Extend and expand your funding...
- Pavement maintenance goals:
 - Reduce moisture intrusion
 - Retard aging

Compared Costs Savings

- Alternative 1
 - Mill and Overlay - \$5.50/yd²
 - Perform mill and overlay at 1 and 9 years
- Alternative 2
 - ASI-GSB sealer \$0.50/yd²
 - Perform mill and overlay at 1 year and ASI-GSB at 1, 5, 9 and 13 years

Savings

- Mill and Overlay - \$11.00/yd²
- Mill and Overlay + ASI-GSB sealer - \$7.50/yd²
- Total Savings of \$350,000 over a 7 mile road

Dr. Ron Hudson

Analysis of PMS Data for Engineering Applications

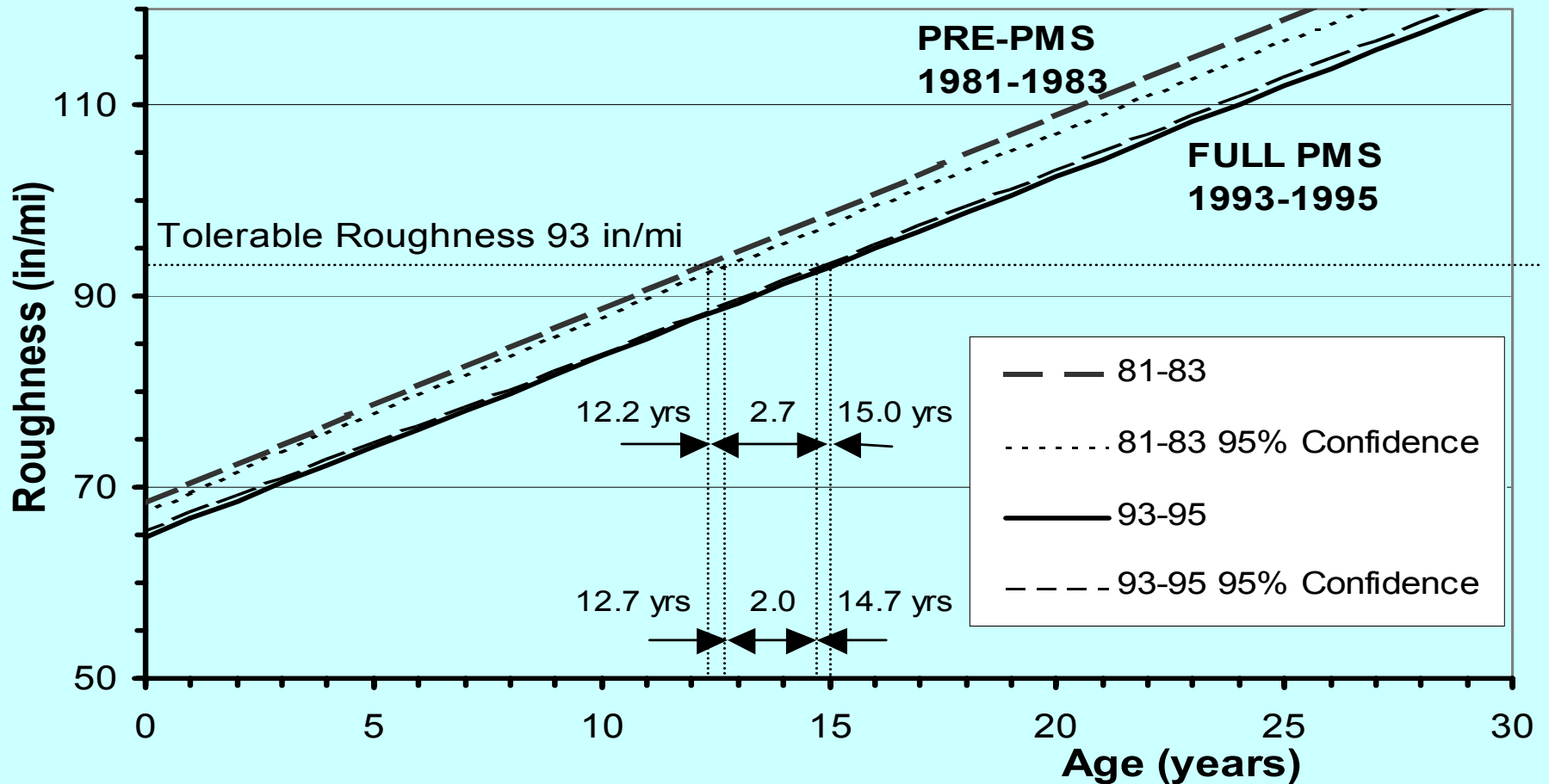
- Pavements are engineered structures, therefore Engineering analysis:
 - Improves pavement performance
 - Can be used for network or individual problems
 - Is essential for feedback purposes

Purpose and Benefits of PMS

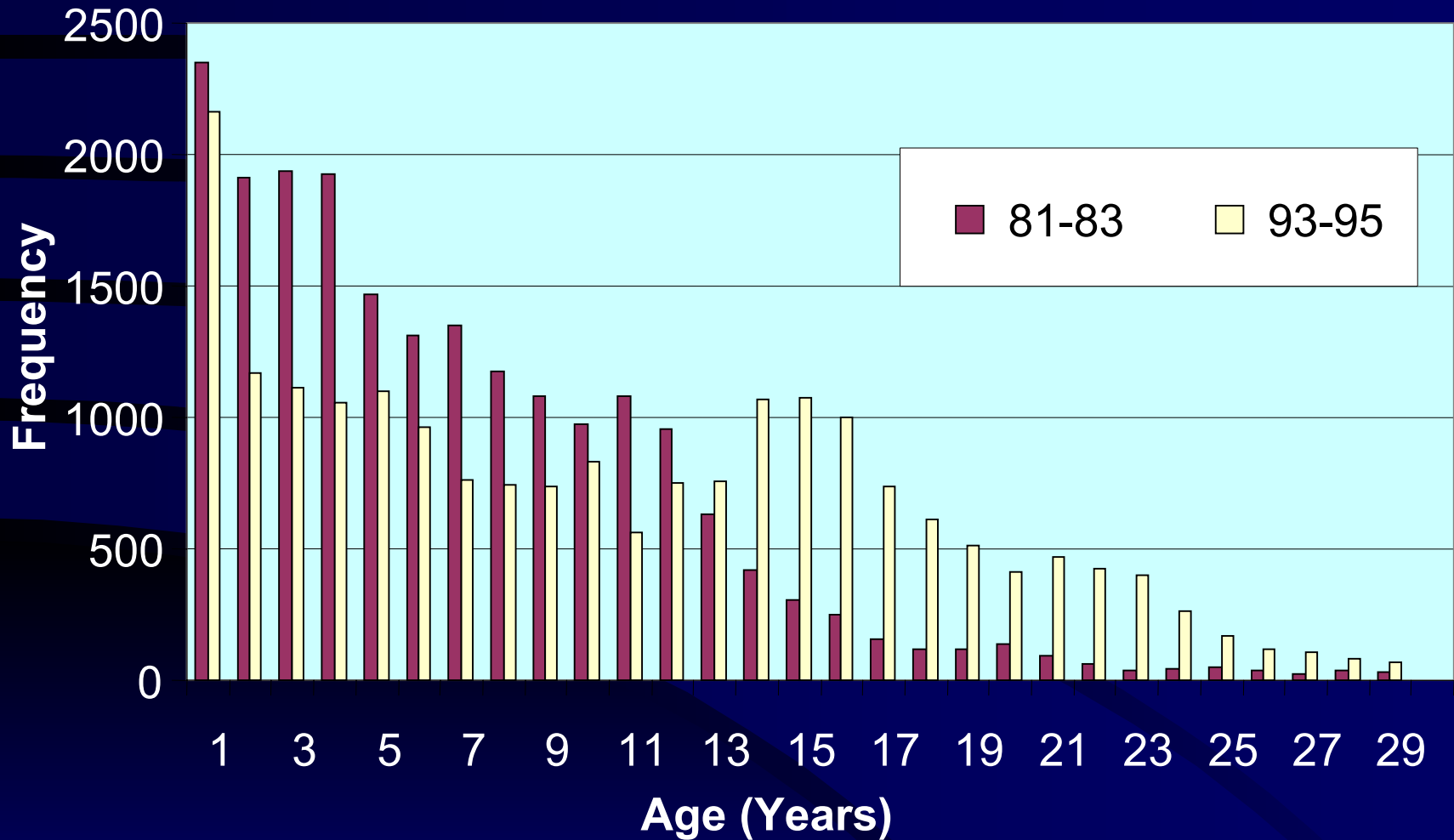
- TRDI conducted a study for Arizona DOT in 1998, which compared pre-PMS data to post-PMS data.
- Roughness was found to be the best indicator of performance and shows the best correlation for data

PMS Results in Longer Life

Roughness All Roads, All Pavements



Age Distribution All Roads, All Pavements



Adel Hedfi

Integration of Network Level PMS with
Project Selection, Design and
Implementation

Maryland's Transition from a Traditional
Planning Process to Proactive Planning
Process.

Traditional Planning Process

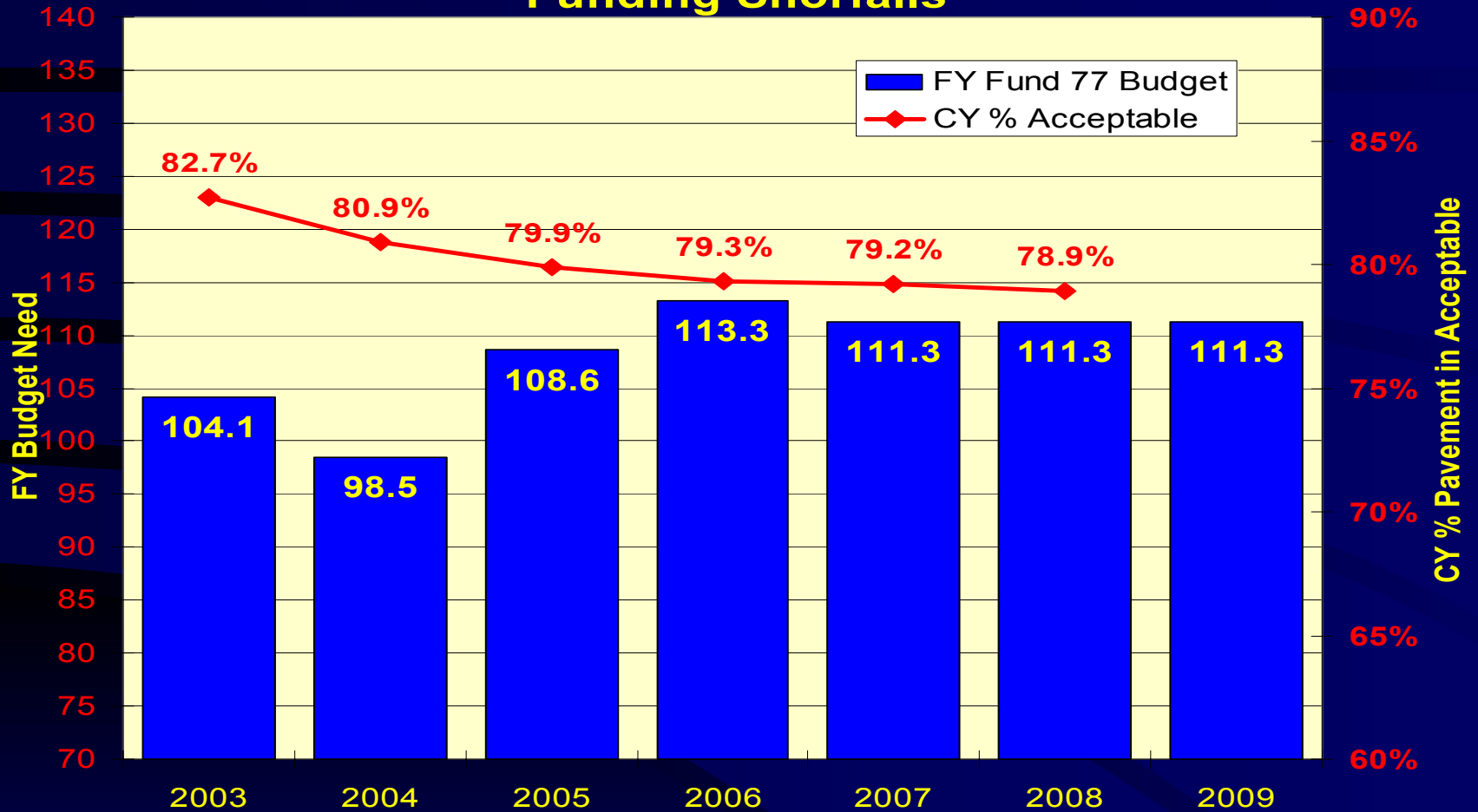
- Collecting road condition data
- Priority listing (worst first)
- Annual meeting (select projects)
- Budget allocation
- Maintenance and rehabilitation projects

Proactive Planning Process

- Construction History
- Maintenance History
- Roadway Inventory
- Local Expertise
- Performance Data

Predicted Conditions

Network Condition Impact Based on Expected Funding Shortfalls



Average of \$108 Million/FY

Katie Zimmerman, P.E.

Integrating Preventive Maintenance into Pavement Management

- Existing Gaps
- Three approaches to Integration
- Steps to Improve Integration

Existing Gaps

- Data collection activities
- Condition Indexes
- Performance Models
- Treatment triggers and impact models

Approaches to Integration

- Pavement sections that are NOT candidates for rehabilitation or reconstruction
- Preventive maintenance treatments are considered collectively as a treatment
- Specific preventive maintenance treatments are recommended based on PMS information

Steps To Improve Integration

- Identify your needs
- Identify the gaps
- Develop a plan
 - Identify data sources
 - Collect data needed to support analysis
- Implement the plan

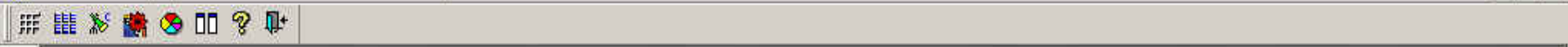
Benefits to Integration

- More coordinated work plans developed to accomplish agency goals
- Better able to demonstrate the benefits in using preventive maintenance treatments
- Better informed to make decisions about treatment needs

Jon Wilcoxson

Integrating Pavement and Maintenance Management... Taking Pavement Management One Step Further

- Why do we perform maintenance work?
 - To correct or prevent defects
- MMS captures all maintenance activities and costs
- The Maintenance Rating Program captures the status of the network



Index	Index Name	Definition Style	User Update	Date Update
2	KYTC	Weight	LEN	12/20/2001 12:55
1	Appearance	Weight	RANDY	6/11/2003 16:18:3

Defect	Weight
Appearance	0.03
Attenuators	0.03
Barrier	0.03
Bumps	0.03
Curb	0.04
Ditches	0.04
Drain	0.04
Fencing	0.03
Guardrail Damage	0.04
Guardrail Height	0.03
Guide Sign	0.02
Guide Sign Assembly	0.02
Pavement Drop	0.05
Potholes	0.05
Rideability	0.1
Rutting	0.03
Shoulder Dropoff	0.04
Shoulder Height	0.04
Shoulder Potholes	0.03
Vertical Clearance	0.03
Visual Obstruction	0.05
Warning Sign	0.05
Warning Sign Assembly	0.05

Weighting is set for each defect.



Label	Activity Name	Unit
A020 MACHINE PATCH	A020 MACHINE PATCH	tons
A030 SURF-ABNORM REP	A030 SURF-ABNORM REP	tons
A040 SURF-REPAIR PCC	A040 SURF-REPAIR PCC	sq. ft.
A050 SURFACE-SPOT SEAL COAT	A050 SURFACE-SPOT SEAL COAT	tons
A070 JT-CRK SEAL OF PCC	A070 JT-CRK SEAL OF PCC	linear foot
A080 SEAL PVMT-SHDL JT	A080 SEAL PVMT-SHDL JT	linear foot
A100 MT RR PROT DEVICES	A100 MT RR PROT DEVICES	none
A110 SURF-TB MAINT	A110 SURF-TB MAINT	Ln. Mile
A120 SURF-PATCH TB MAIN	A120 SURF-PATCH TB MAIN	tons
A140 TOTAL CONTRA PATCH	A140 TOTAL CONTRA PATCH	tons
A150 VENDOR AIDED PATCH	A150 VENDOR AIDED PATCH	tons
A440 MUDJACKING	A440 MUDJACKING	tons
A710 MILLING-STATE MACH	A710 MILLING-STATE MACH	sq. ft.
A880 BIT COLD MIX PREPARATION	A880 BIT COLD MIX PREPARATION	tons

Maintenance Defects for A020 MACHINE PATCH			
Defect	Proportion	User Update	Date Update
Appearance	15 %	JON	6/20/2003 16:31:21
Potholes	25 %	JON	6/20/2003 16:31:16
Rideability	55 %	JON	6/20/2003 16:31:14
Rutting	5 %	JON	6/20/2003 16:31:18
Total:	100%		

By relating activities to defects, costs required to fix defects can be determined.

Mark Swanlund, P.E.

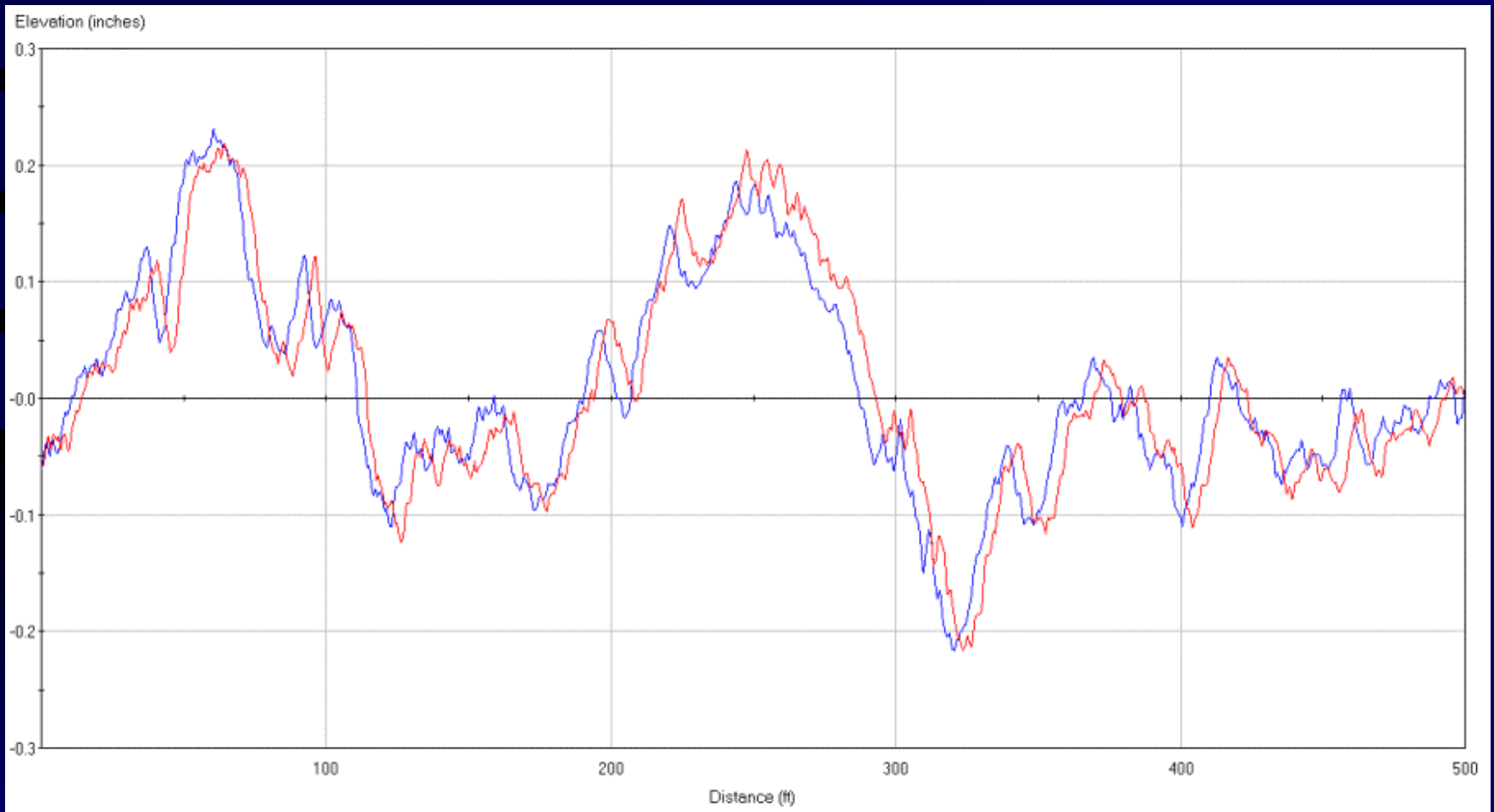
Profile Viewer and Analyzer Software

- Recommended for Development by the ETG
- Can read standard formats:
 - .erd
 - .txt
 - .ppf
 - others

Road Roughness Measures and Types of Profile Analysis

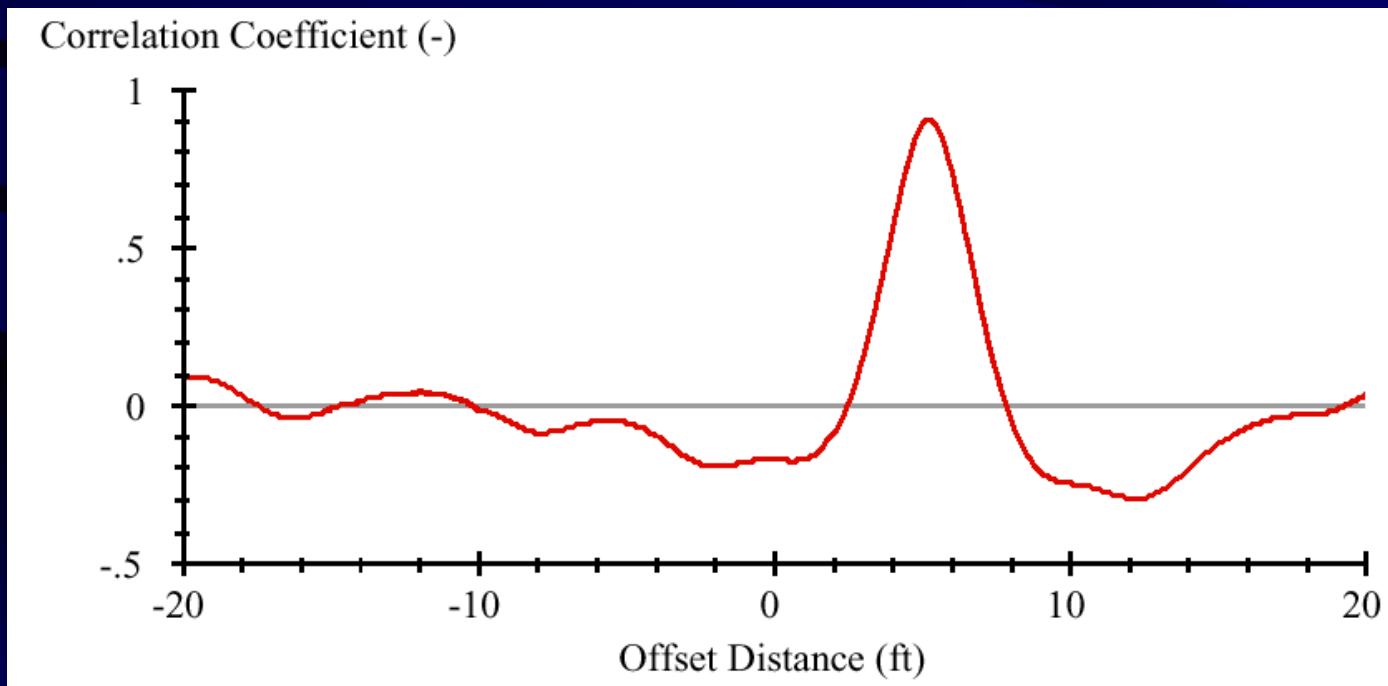
- Many types of road roughness measures are available:
 - IRI is influenced by wavelengths of 4' to 100'
 - RN is influenced by wavelengths of 2' to 33'
- Types of Profile Analysis
 - ASTM E-950
 - Cross correlation
 - Power Spectral Density

Cross Correlation Profile



Cross Correlation

The maximum correlation coefficient achieved is 0.9, by offsetting the blue profile +4.5 feet



Robert OrthMeyer

Pooled Fund Study - Improving the Quality of Pavement Profiler Measurement

- Four year Study
- Commitment from 15 states and FHWA
- \$1,097,200 committed to date - \$40,000 allocated by FHWA LTPP
- The Kick off meeting was held in first week of May

Study Objectives

- Deliver AASHTO Standard Practices and
- Standard Equipment Specification
- Establish Criteria for Calibration Centers
- Develop & Deploy Calibration Device
- Technical Review of Software & Bump Measurement

Kickoff Meeting Priorities

- Topic list of eight potential projects
- Established top priorities
- Develop budget
- Meet with Contracting Officer in July
- Publish Request for Proposals

Top Potential Projects

1. Reference Profile Device
2. Critical Profile Accuracy Requirements
3. Construction Acceptance and Correction Software
4. Certification / Validation Sites

For information or if your state would like
to join...

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www.pooledfund.org