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MEPDG Local Calibration Requirements

Harold L. Von Quintus, P.E.

APPLIED RESEARCH ASSOCIATES, INC.
An Employee-Owned Company

Presentation Overview

1. Introduction: Presentation Assumptions & Status of MEPDG
2. Why Local Calibration
3. Steps for Local Calibration
4. PMIS Data and Local Calibration
5. Summary Comments

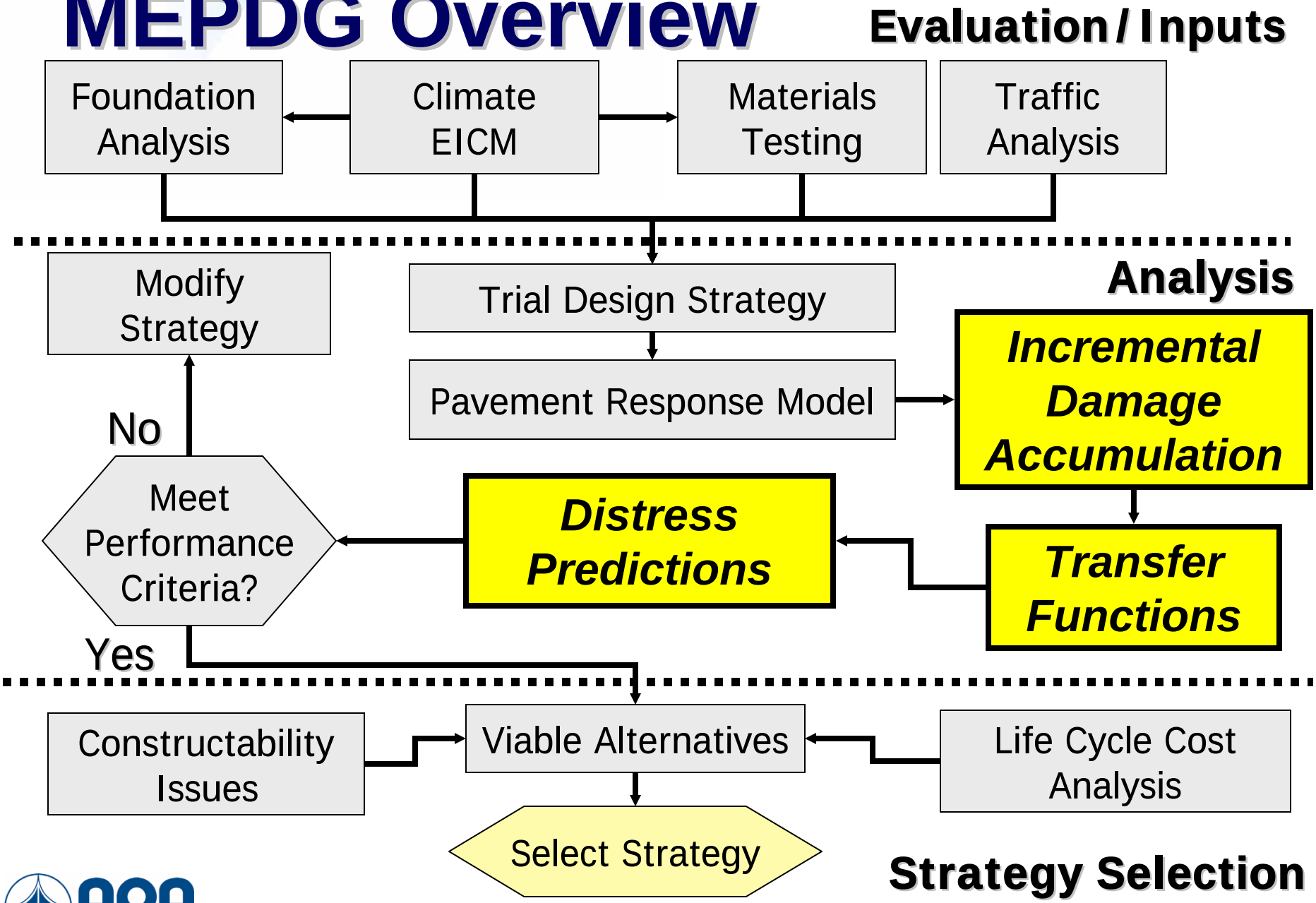
Assumptions for Presentation

1. Agency has plans to use the MEPDG.
2. Agency plans to confirm calibration coefficients of distress prediction equations in MEPDG.
3. Agency has an active PMIS and routinely updates database.

MEPDG Status

- Manual of Practice submitted February 2007
- JTCP; 81% affirmative vote
- Moves on to subcommittee on materials & pavements
- Version 1.0 submitted, April 2007

MEPDG Overview



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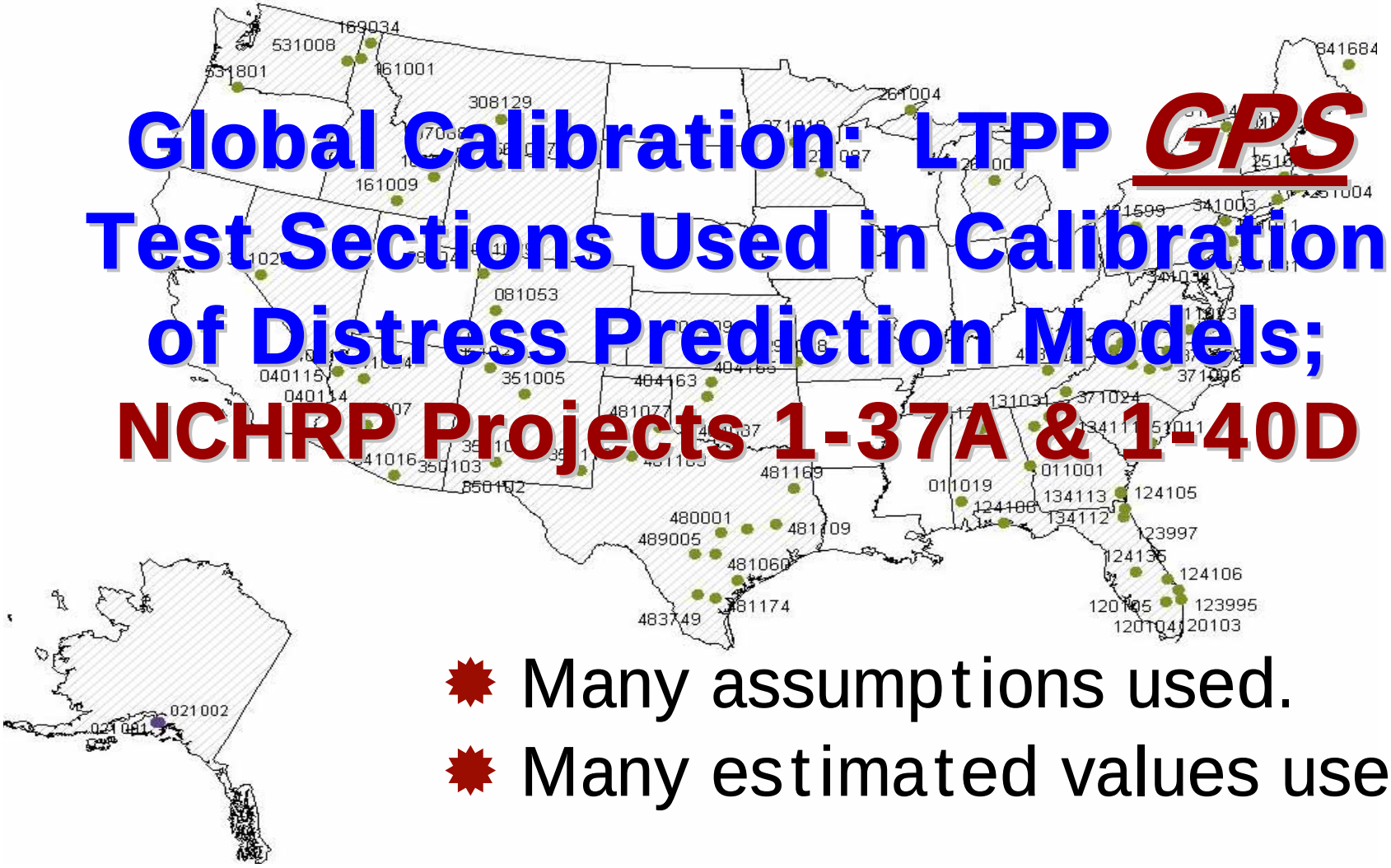
2. **Why Local Calibration**
3. Steps for Local Calibration
4. PMIS Data and Local Calibration
5. Concluding Comments on Data Integration

Why Local Calibration?



Global Calibration: LTPP *GPS*
Test Sections Used in Calibration of Distress Prediction Models;
NCHRP Projects 1-37A & 1-40D

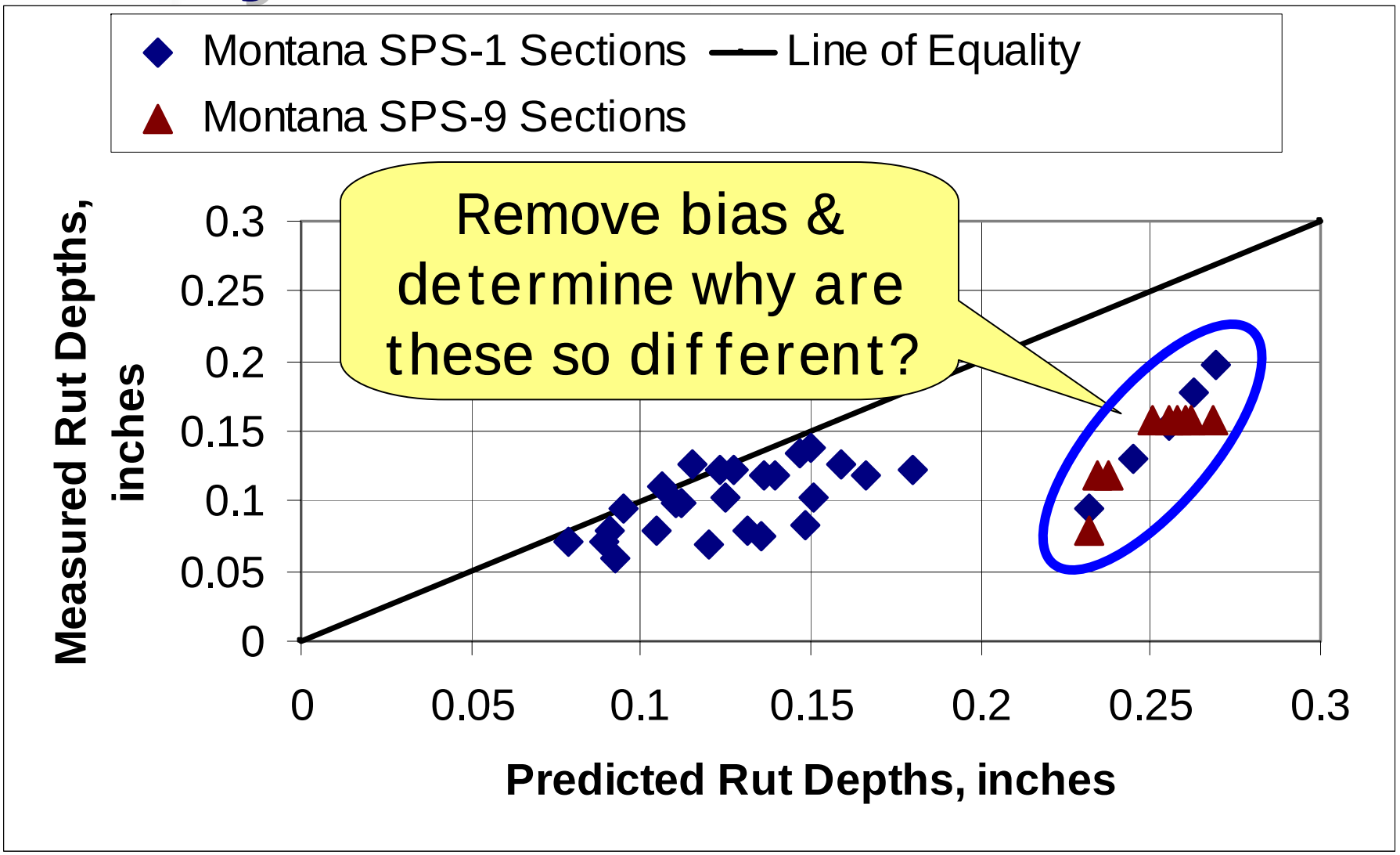
- Many assumptions used.
- Many estimated values used.

Why Local Calibration?

- Expansive Soils
- Maintenance/Preservation Strategies
- Other Policies
- New Technology & Material Differences

Consideration of factors *NOT* included in MEPDG.

Why Local Calibration?



MEPDG – Local Calibration

Manual of Recommended Practice for Calibration of M-E Based Models

1. Confirming or adjusting the global calibration factors.
2. Detailed and practical guide to complete local calibration.

NCHRP 1-40B; Draft available later this year.

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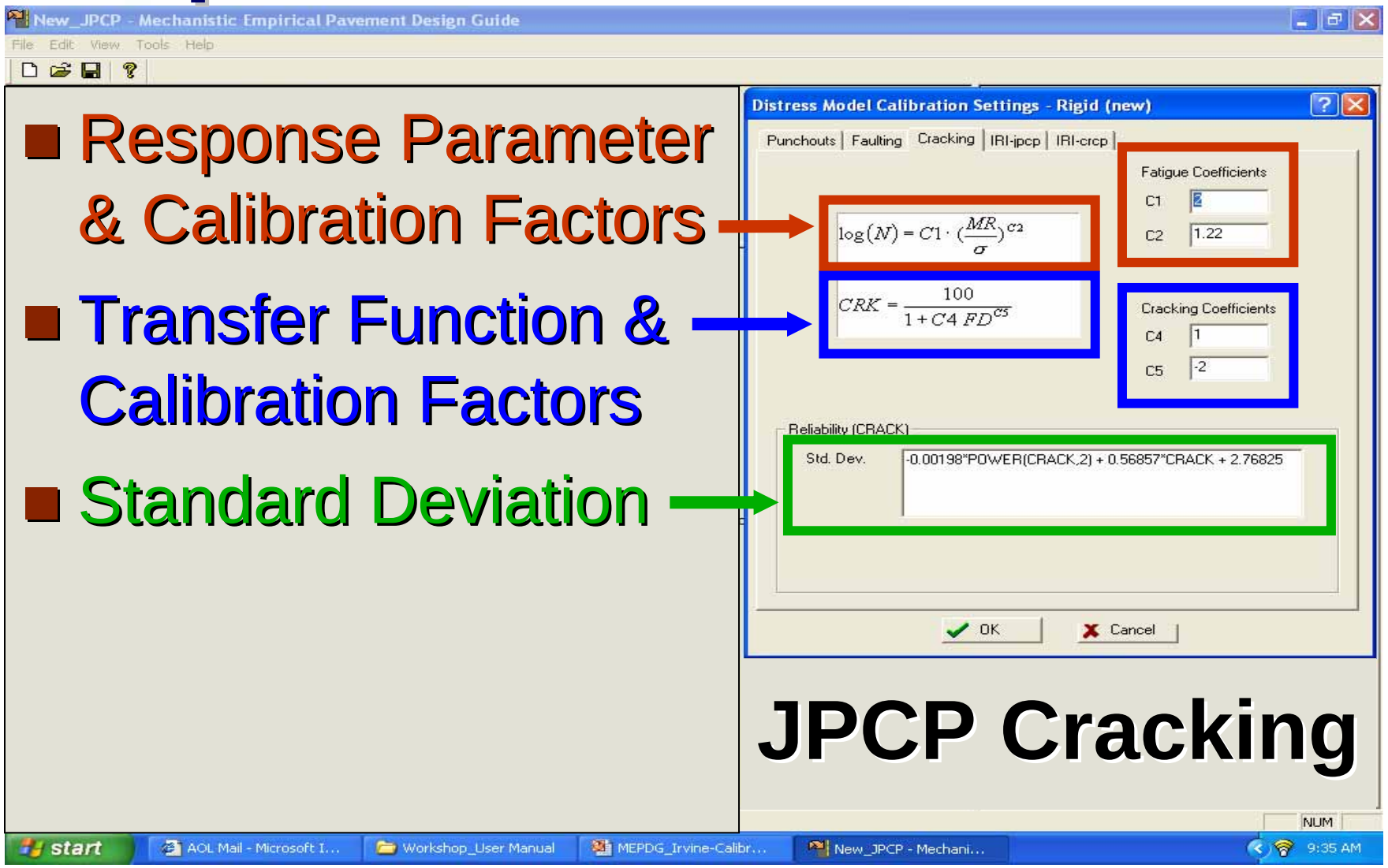
Steps: Local Calibration Hypotheses

- Mathematical models – assumed to be correct.
  - Response models
  - Climatic model – ICM
  - HMA aging/PCC strength time dependent model
- Statistical or empirical models (transfer functions) may result in bias.
  - Revision of model coefficients to remove bias.

Steps: MEPDG Ease of Use



Steps for Local Calibration

1. Select hierarchical input level
2. Develop experimental design & matrix
3. Determine sample size
4. Identify roadway segments
5. Collect & evaluate data for anomalies
6. Conduct field investigations

Policy decision.

Level of confidence.

1. LTPP sections
2. Research sections
3. PMIS segments

Testing & distress definitions

Steps for Local Calibration

7. Assess bias
8. Eliminate bias
9. Assess standard error
10. Improve model precision
11. Interpretation of results & decide on adequacy of calibration factors

Execute MEPDG & evaluate residual errors.

Dispersion around line of equality

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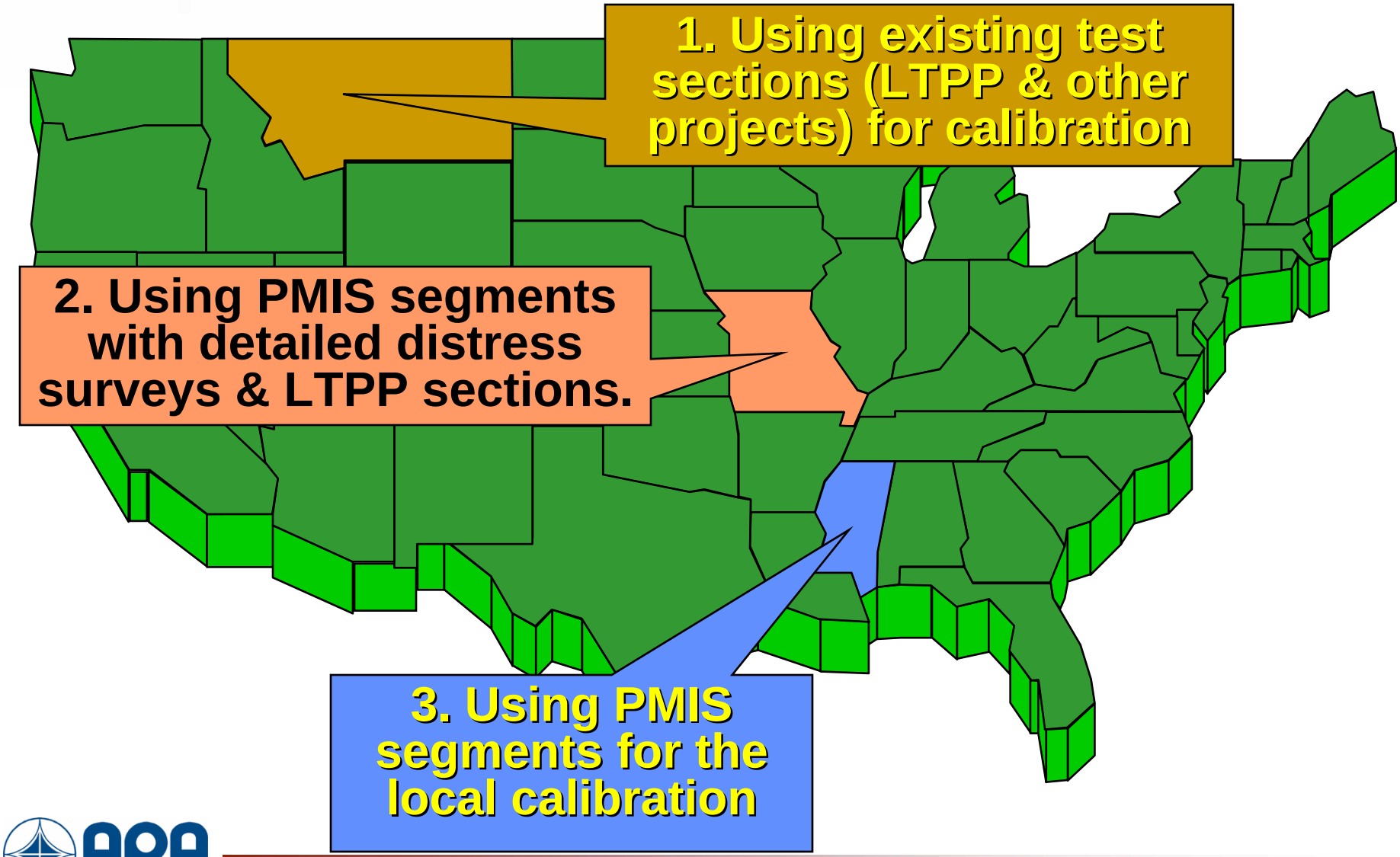
Distress Data Sources

- LTPP
- Special Agency Test Sections
- PMIS Sections – A quick check:
  - Do the distress predictions match our local experience for traditional designs?
  - What is the primary failure mode triggering rehabilitation?

Distress Data Options



Data Needs: Robust Distress Data

1. Time series data for different distress
2. Roadway sections, ***NOT*** APT sites
3. ***Pavement management data***
   - Large time-history distress database
   - Many dollars expended to collect data
4. ***Issues***
   - Distress definition; how measured
   - Accuracy of measurements

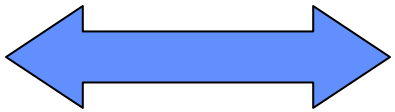
Data Needs: Project Level

- Determine design strategy, material type, layer thickness
- Satisfy design criteria.

- Prioritize projects, select repair strategies, optimize costs
- Maintain desired performance level.

Can data collected for different purposes be used together?

Data Needs: Distress Definition & Measures



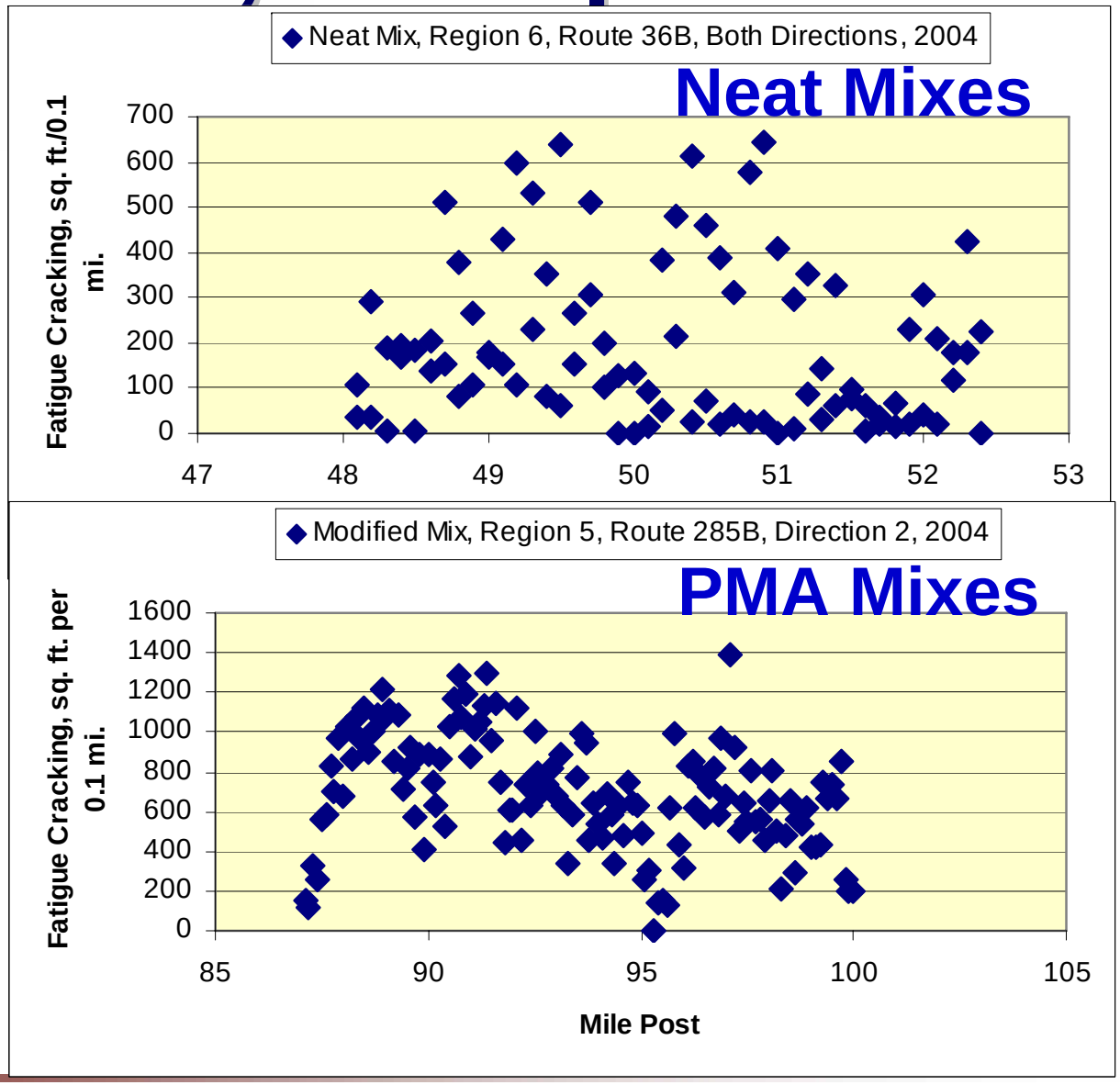
MEPDG	PMIS
Fatigue – Area Cracking	Fatigue Cracking
Fatigue – LCWP	Transverse Cracking
Thermal – Transverse Cracking	Rutting
Rut Depths	Profile
IRI	

Are Definitions & Measurements Compatible?

Distress Data, Example:

Variability; A key data issue.

Example; Fatigue Cracking

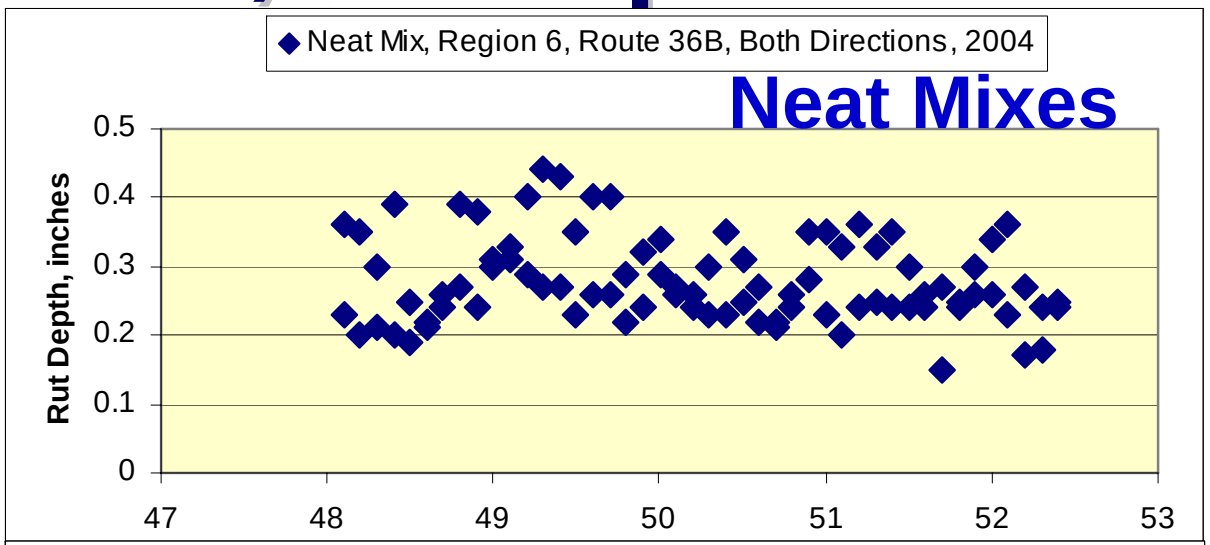


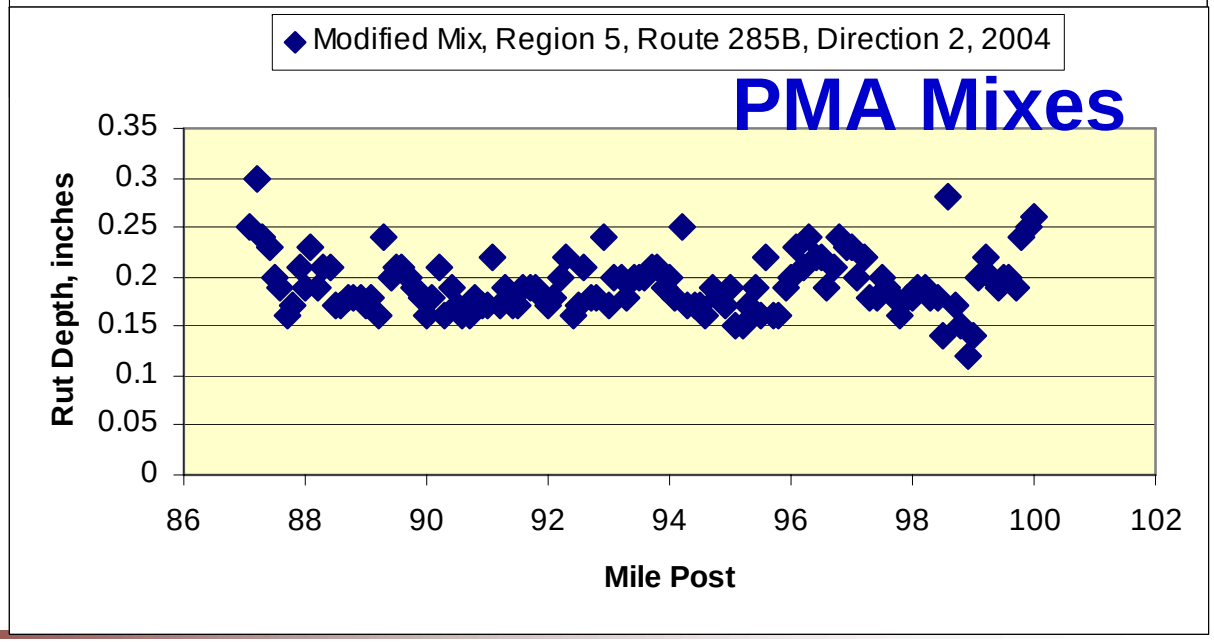
Distress Data, Example:

Variability;

A key data issue.

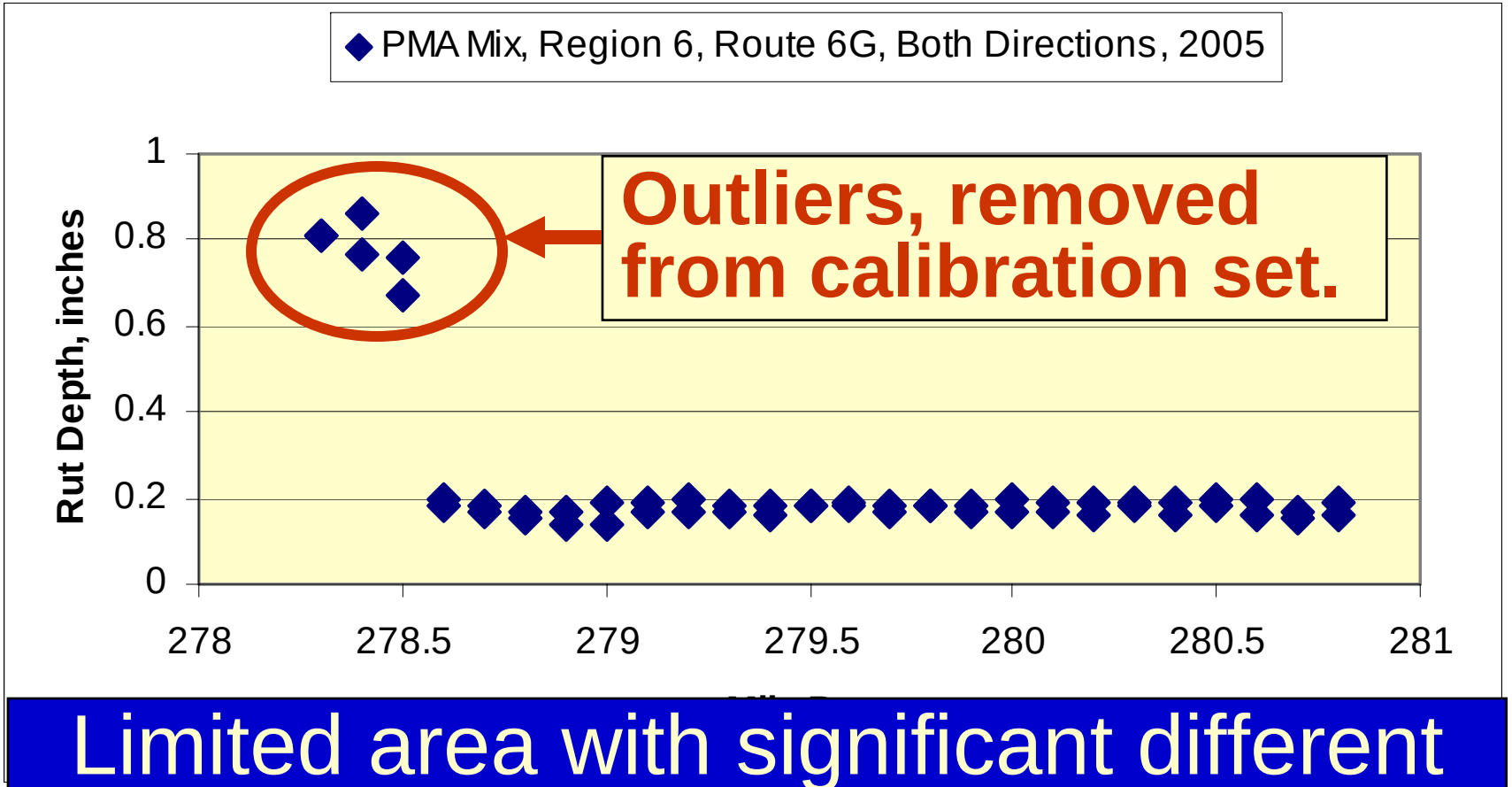
Example; Rut Depth





Distress Data Analyses:

Within Project Variation; ***Outliers***

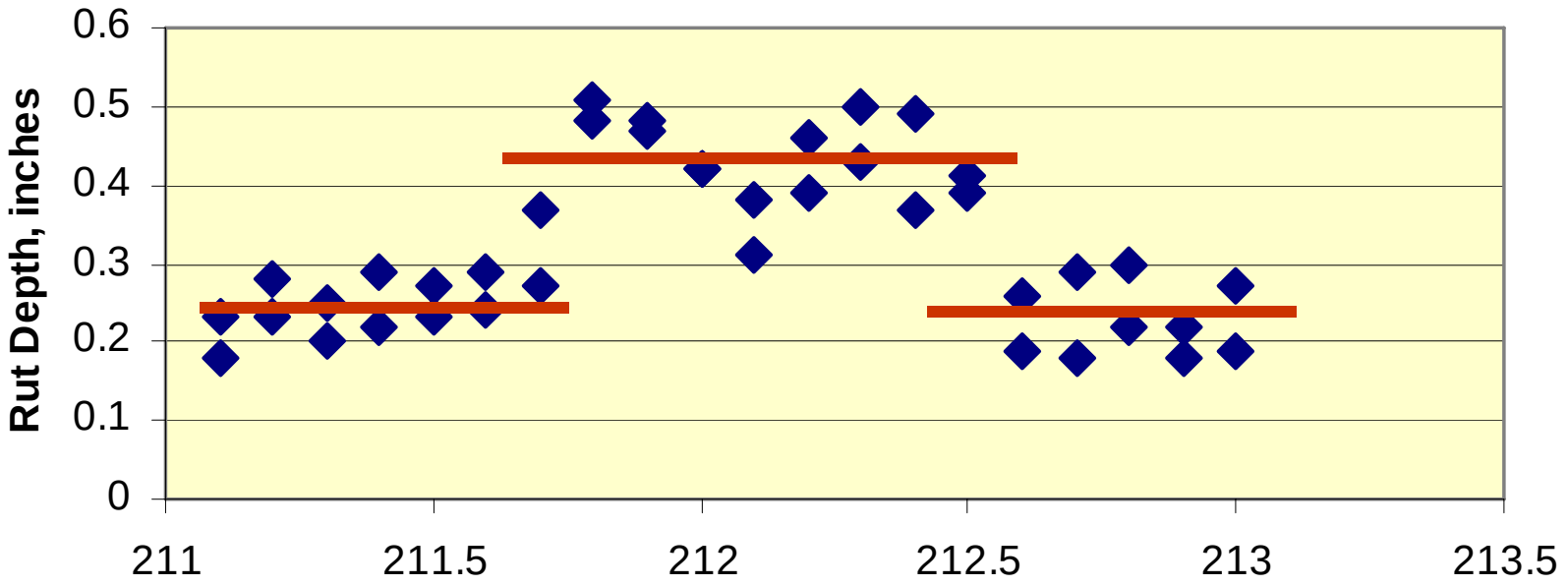


Limited area with significant different distress value within PMIS segment.

Distress Data Analyses:

Within Project Variation; ***Abrupt Change***

Identify reasons for abrupt changes.

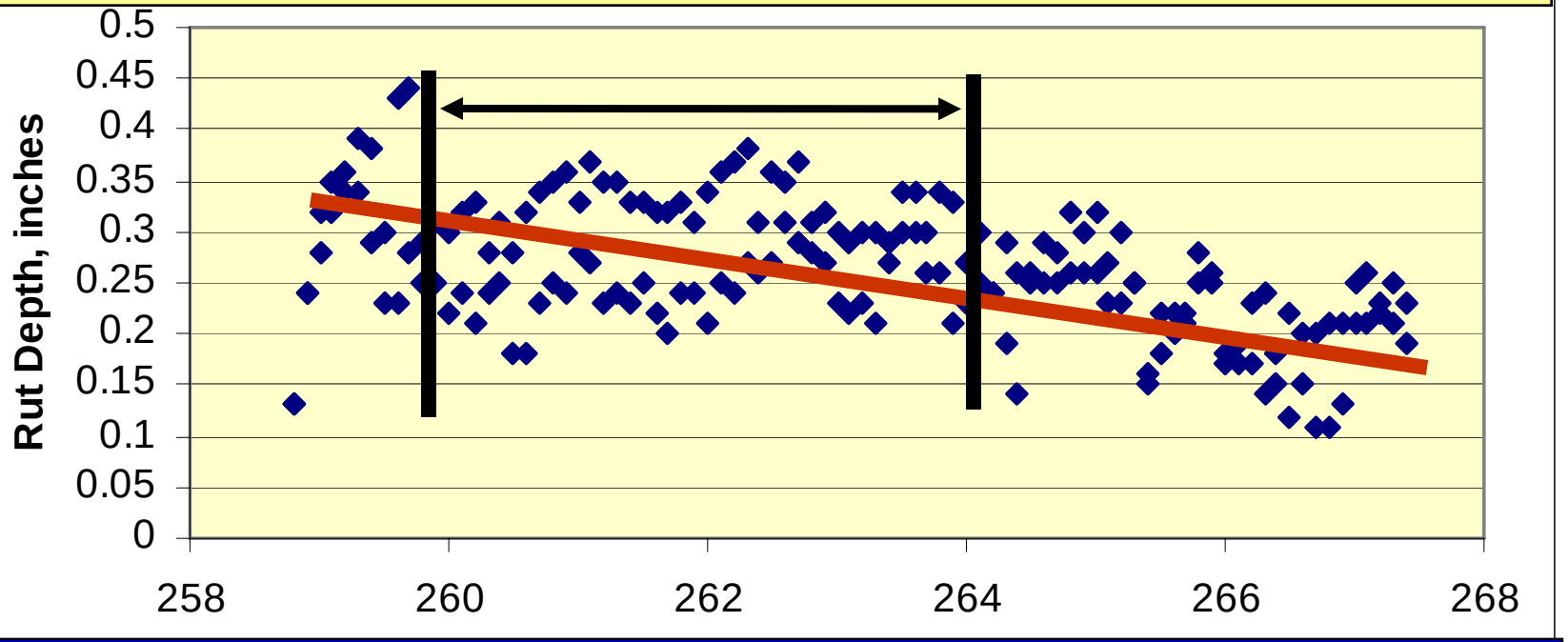


Sudden increase or decrease in distress value within PMIS segment.

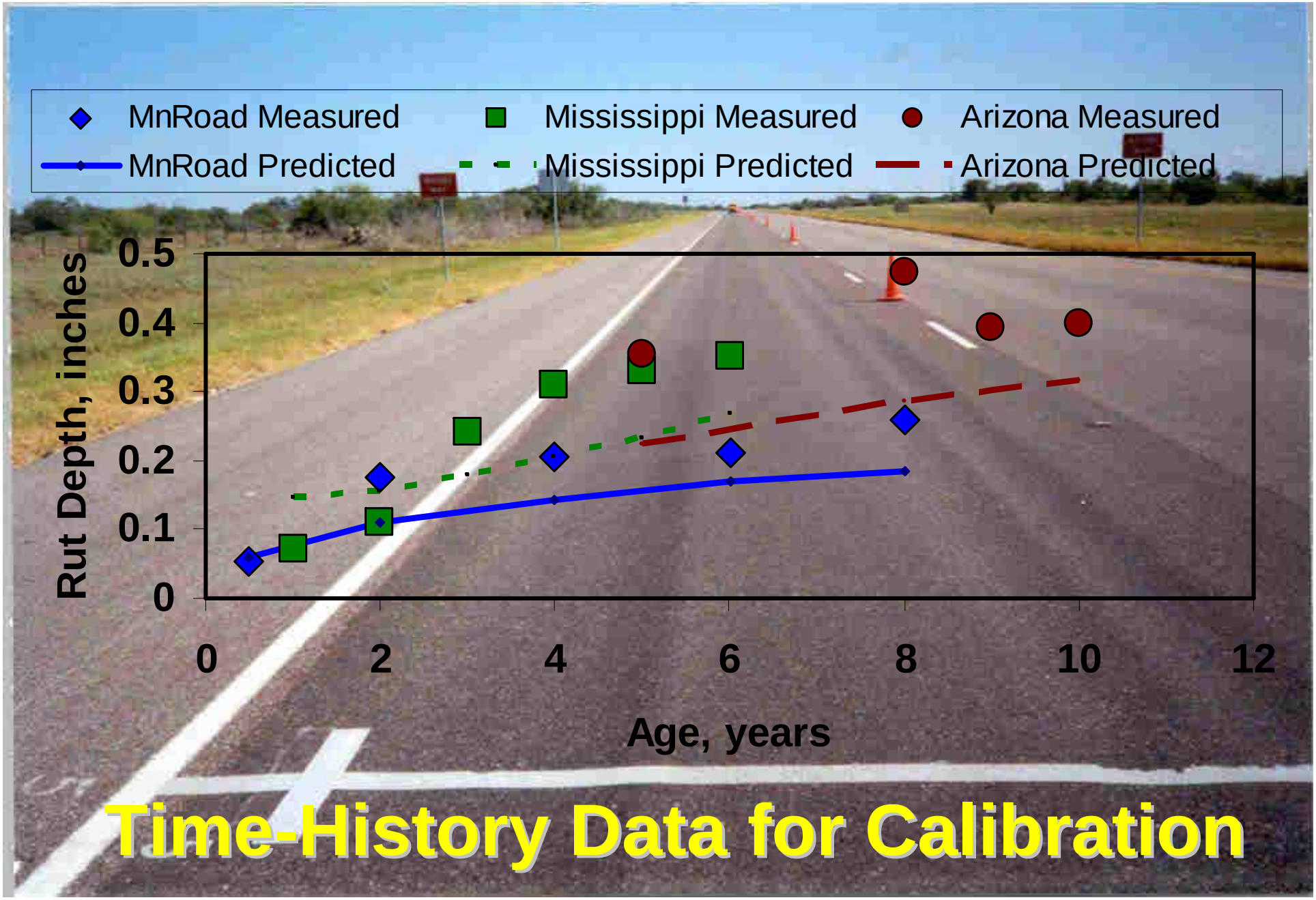
Distress Data Analyses:

Within Project Variation; ***Drift***

Use segments w/consistent averages.



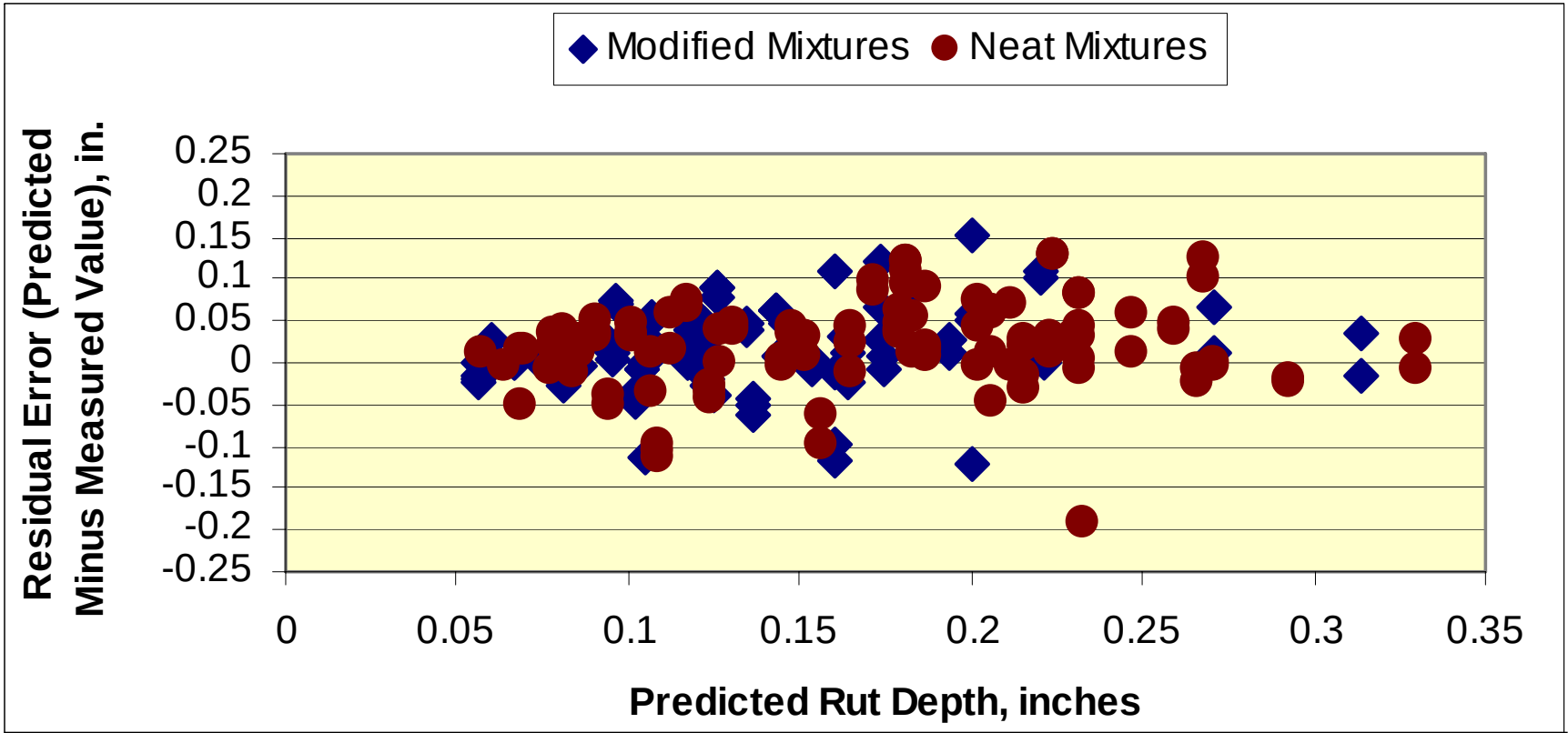
Consistent change in distress over project length, within PMIS segment.



Time-History Data for Calibration

Distress Predictions Analysis:

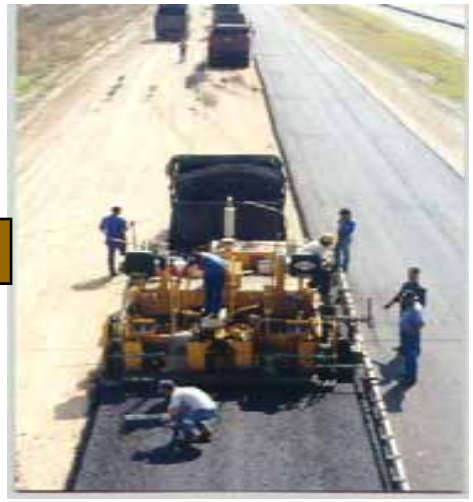
Residual Errors, Rutting.



No bias between neat & PMA mixes!

Summary:

Effective use of available but limited resources.



PMIS Database

Project Level Data

Thank you.
Any Questions?

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