# National Seminar

## Moisture Sensitivity

# Introduction & Objectives

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# Presentation Outline

- Seminar Objectives & Scope
- The Problem
  - Extent
    - Mechanisms
      - Causes & Effects
        - Identification
          - Solutions
- Deliverables

# Objectives

- Identify
  - Best Practices
  - Gaps in Knowledge
  - Research Needs
- Develop Road Map for Mitigation

# Scope

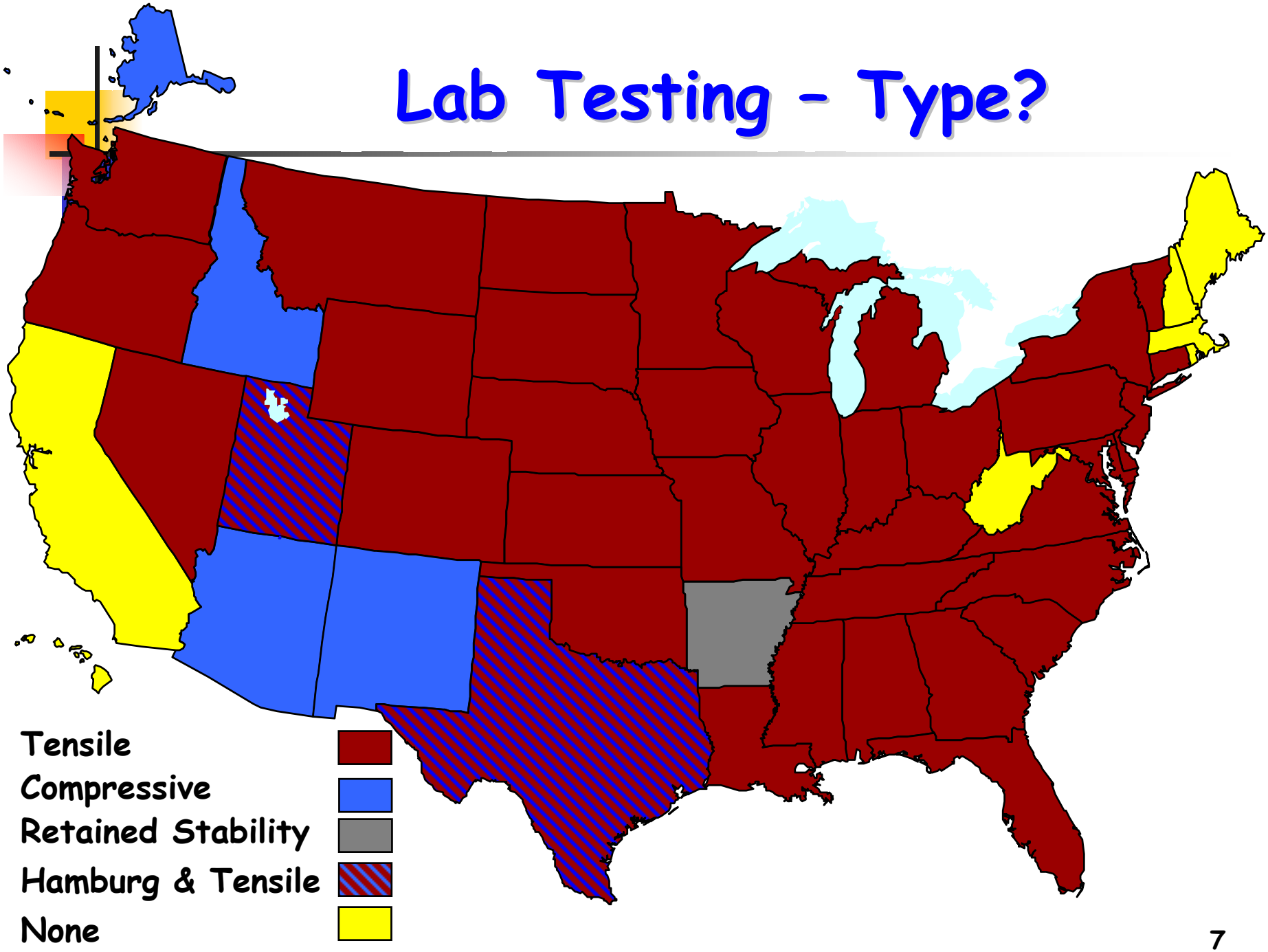
- Problem Identification
- Fundamental Concepts
- Testing
- Treatment
- Production & Construction
- Field Performance – Case Studies
- Specifications

# Prophesy?

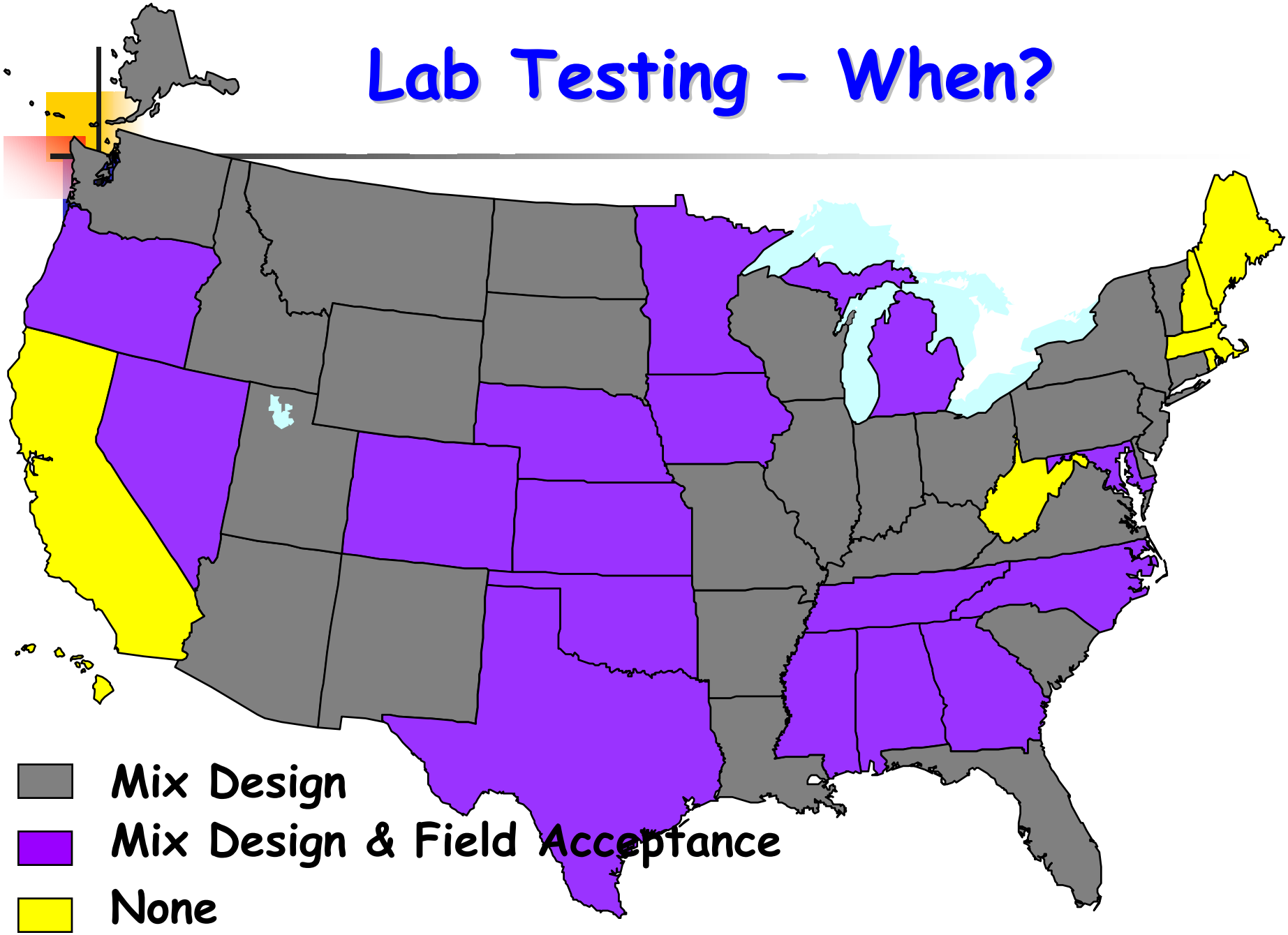
A complete solution to this problem may appear from another source…there are many methods of treatment being advocated..which should improve the capacity of any asphalt to stick to virtually all aggregates. When this agent is available, this problem will largely disappear, although accurate test methods will be needed to compare the effectiveness of the treatments.

*Francis Hveem - AAPT 1943*

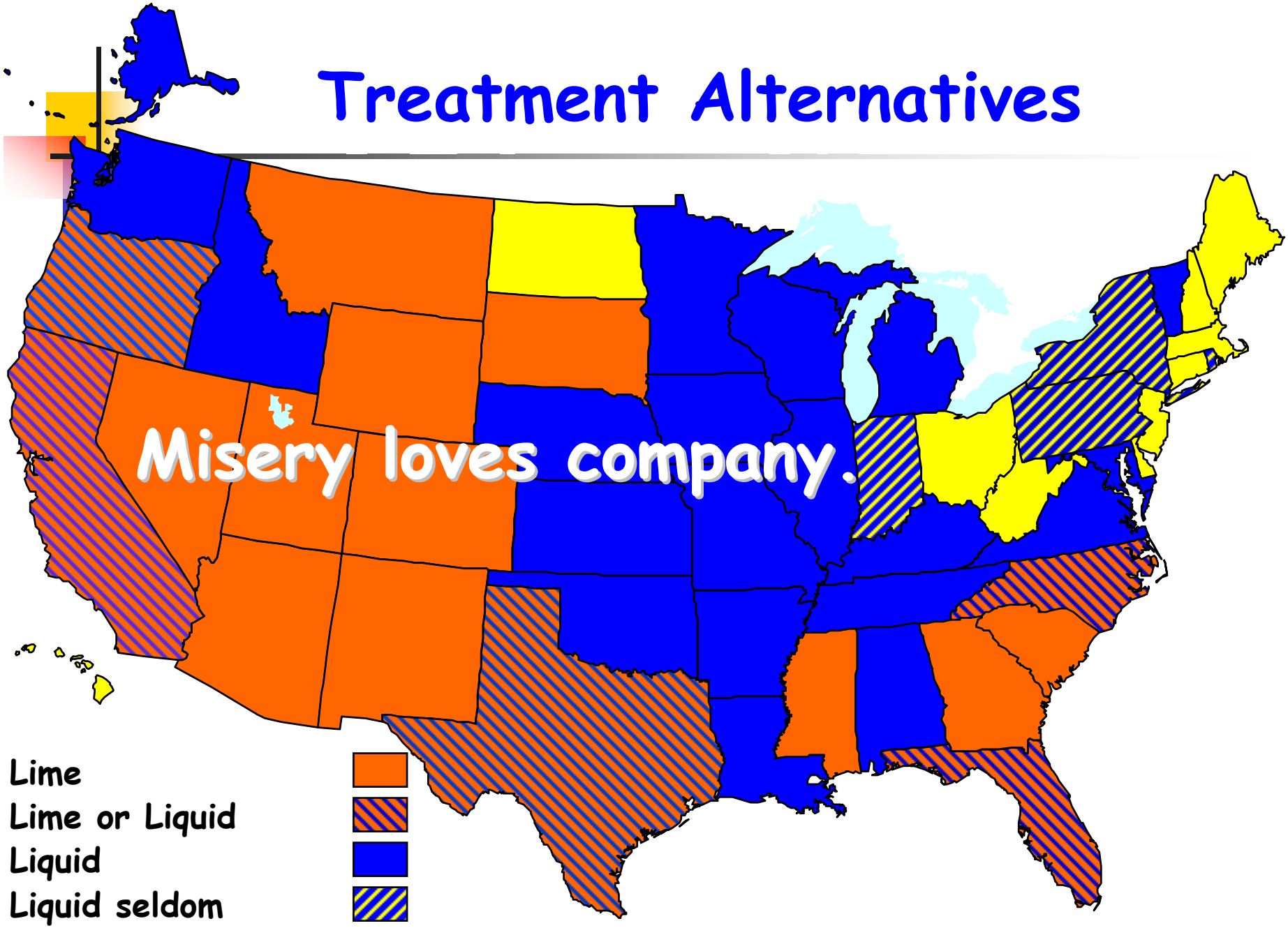
# Lab Testing - Type?



# Lab Testing – When?

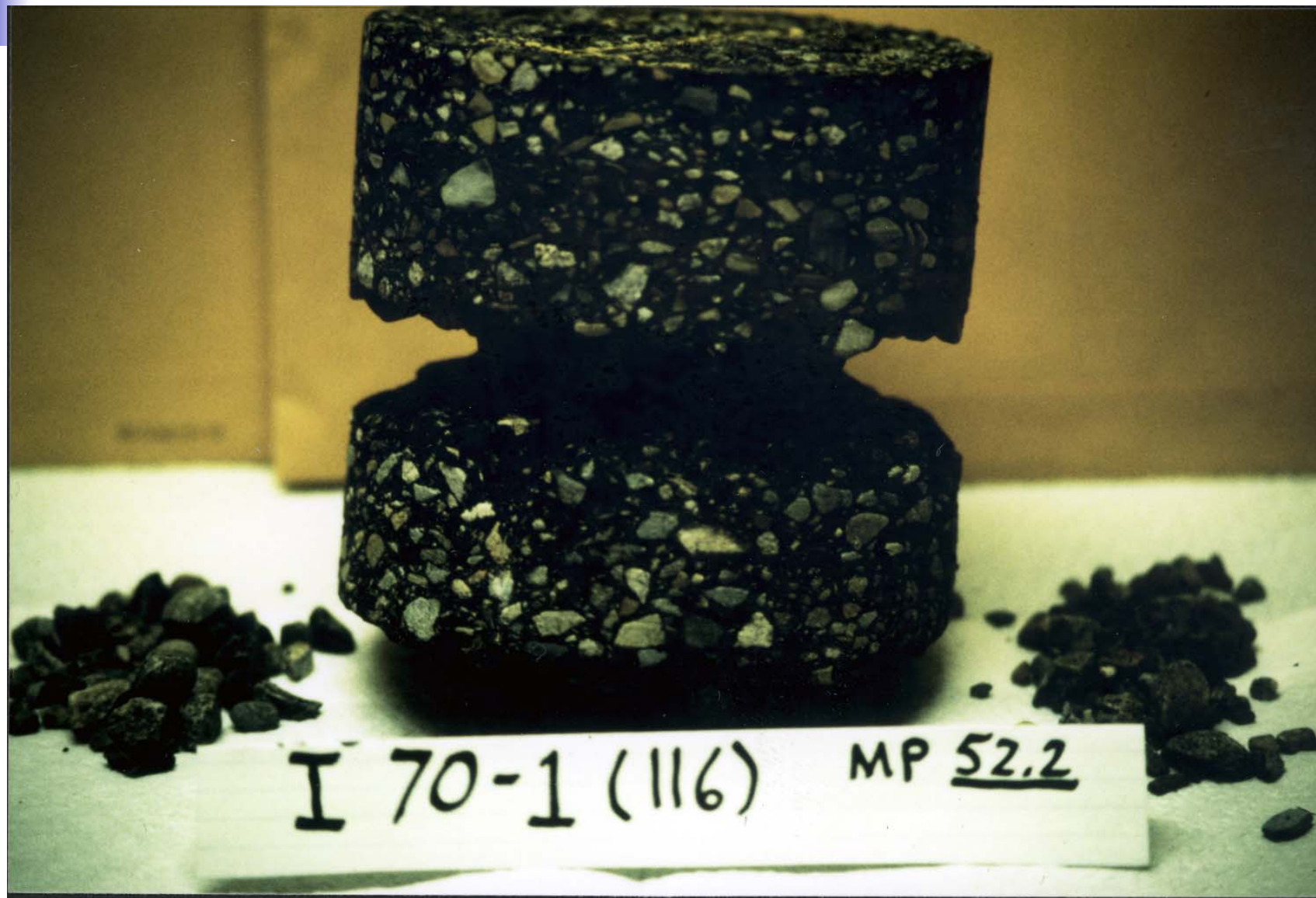


# Treatment Alternatives




Lime
Lime or Liquid
Liquid
Liquid seldom
No, or very rarely

# Mechanisms



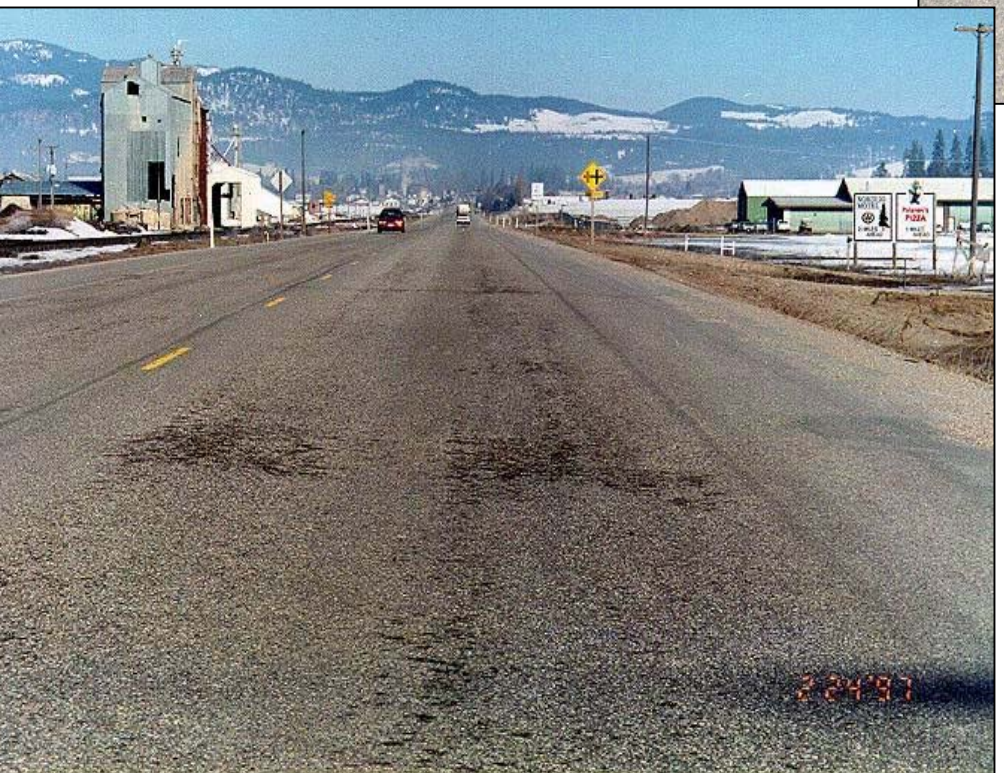
# Causes & Contributing Factors

- Environment
  - Precip, Temp & Elevation
- Materials
  - Quality
  - Compatibility
  - Production
- Design – Structural & Mix
- Construction
  - Hauling, Placement & Compaction

# Manifestation

- Surface Raveling
- Localized Potholes
- Cracking
- Bleeding and Rutting

# Bleeding



# Rutting

# Cracking

Early Raveling
Loss of Fines

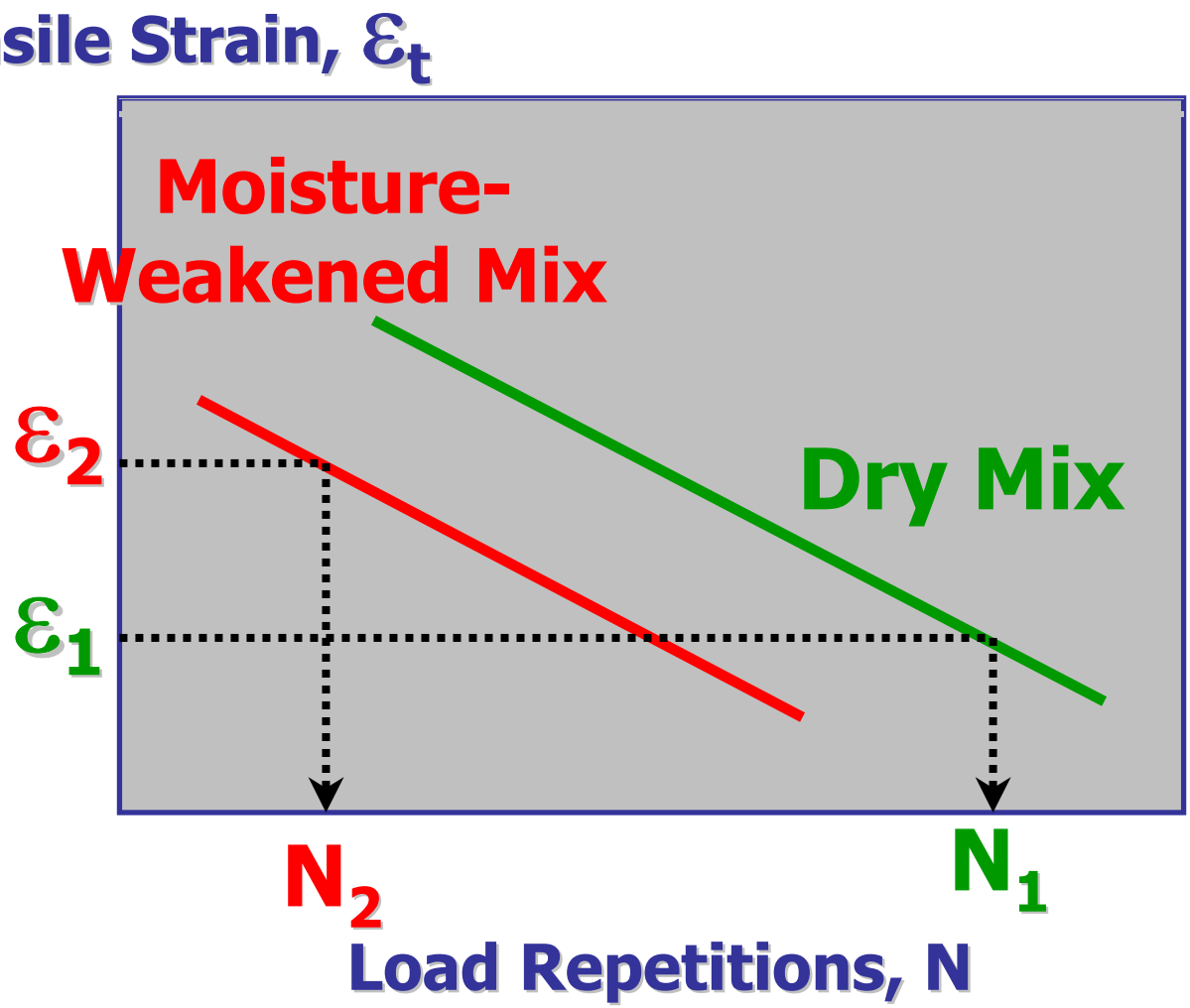
Advanced Raveling

# Delamination

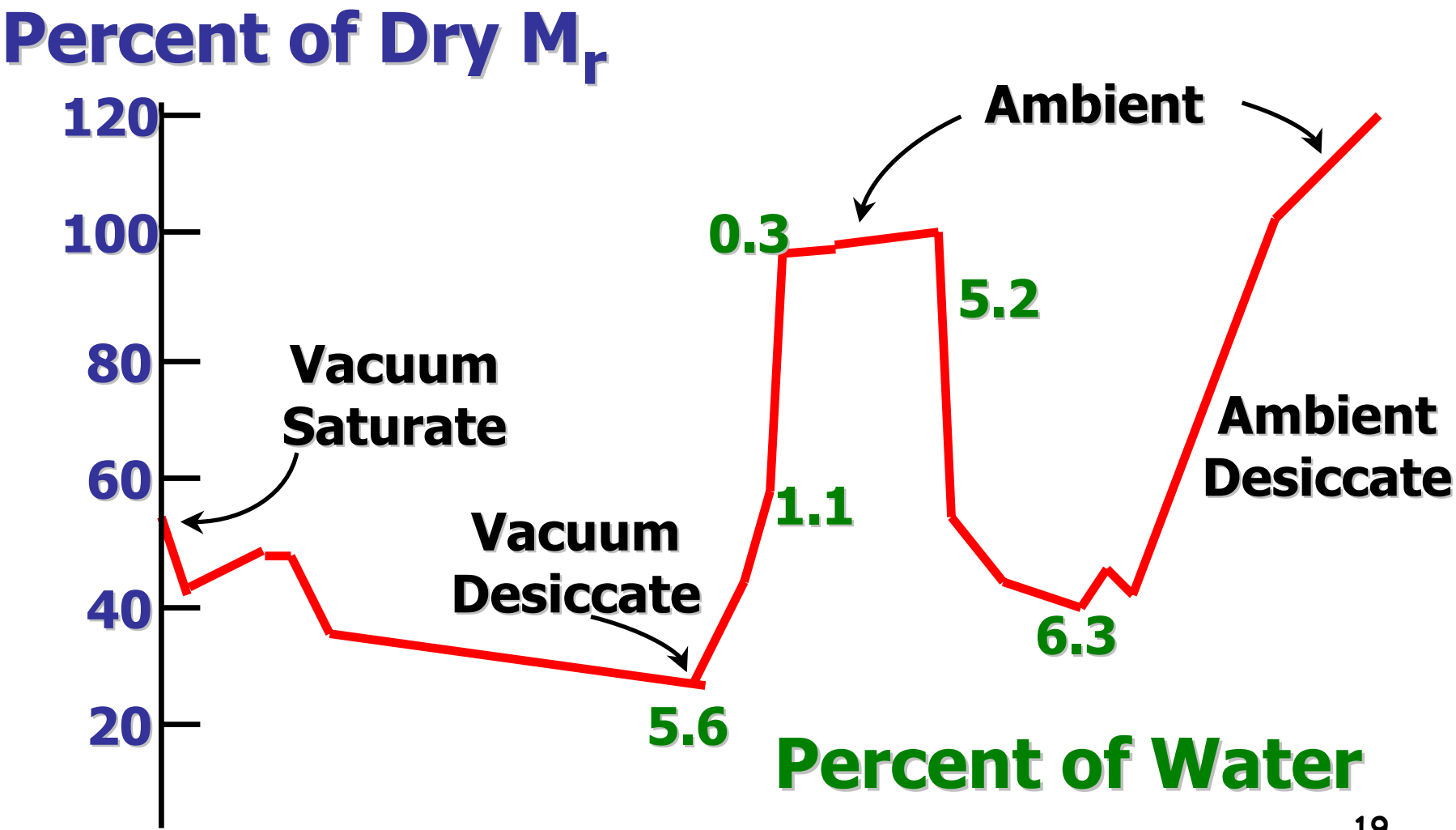
# Collateral Damage

- Exacerbates Load-Associated Distress
  - Fatigue
  - Rutting
- Reduces Mix Stiffness

# Effect on Fatigue



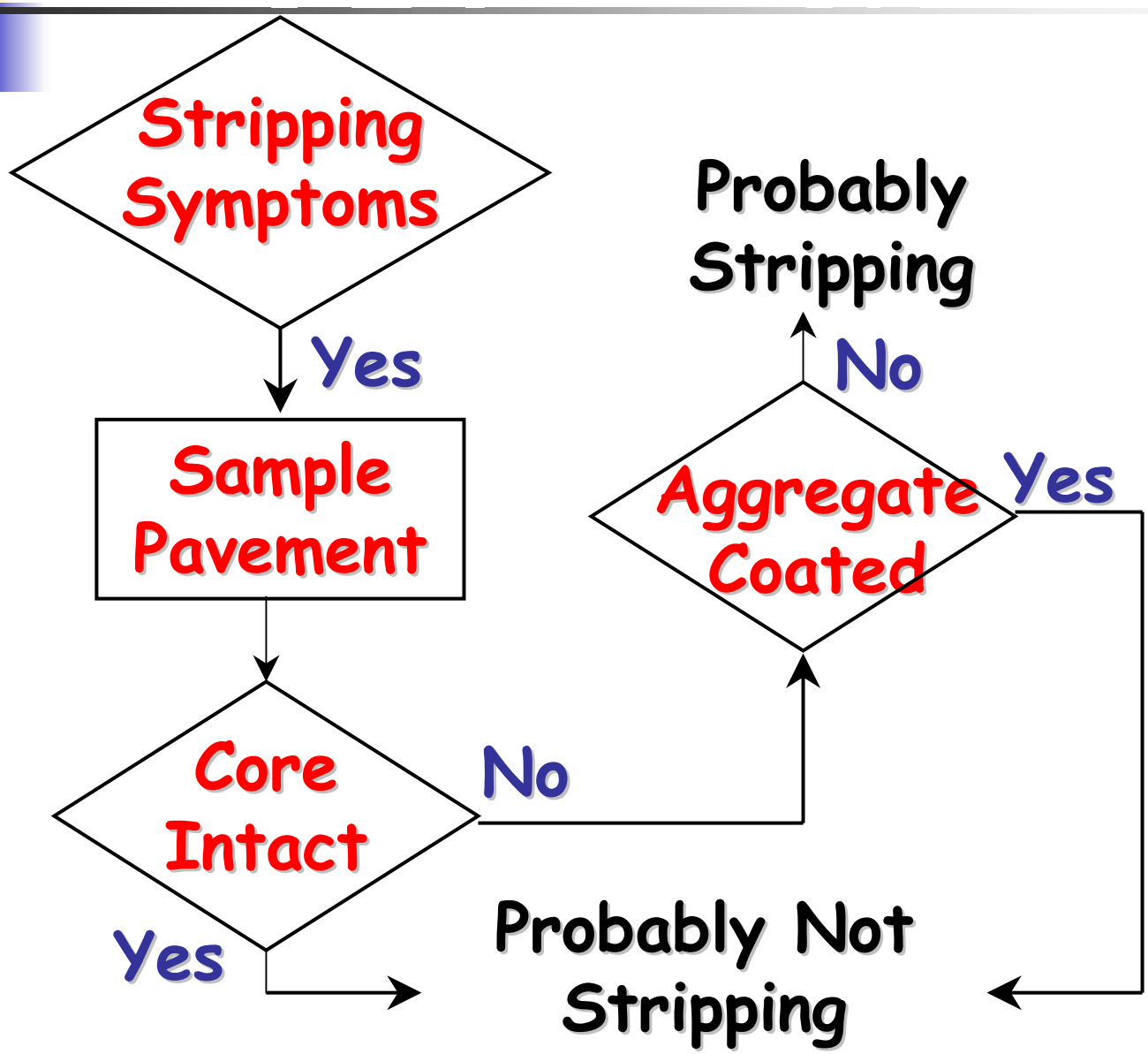
# Effect on Mix Stiffness



# Identification

- Diagnostic Tools
  - Construction Records
  - Flow Charts/Decision Tree
  - Sampling
  - Lab Testing
  - Other?

# Flow Chart


Stripping Symptoms
Yes
Sample Pavement
Core Intact
No
Yes
Aggregate Coated
No
Yes
Probably Stripping
Probably Not Stripping

# Solutions

- Diagnosing the Problem
- Lab Test
  - Discriminating
  - Correlated w/ Field Performance
- Treatments
  - Effective & Economical
- Case Histories
- Improved Specs
- Implementation of What We Know!

# Deliverables

- Synthesis of
  - Best Practices
  - Gaps in Knowledge
  - Research Needs
- Road Map for Mitigation

# Seminar Format

Day 1 – Presentations & Discussion

Day 2 - Facilitated Working Groups

Day 3 - Summary & Synthesis

# Day 1 - Presentations

- Fundamentals – Chemistry & Mechanisms
- Test Methods & Treatments
- Design, Production & Construction
- Field Performance
- Specifications

# Day 2 – Working Groups

- Fundamentals
- Testing & Treatments
- Design, Production & Specs
- Construction & Field Performance

# Fundamentals

- Nomenclature
- Mechanisms
- Material Production, Selection & Compatibility
- Problem Identification
- Gaps in Knowledge

# Testing & Treatments

- Testing – Lab & Field
  - Relationship to Field Performance
  - Precision & Bias
  - Improvements
- Treatment
  - Effectiveness
  - Documentation
  - Cost, Environmental & Worker Safety
- Gaps in Knowledge

# Design, Production & Specs

- Design – Structural & Mix
- Production – Materials & Plant
- Specs
  - Materials, Production & Placement
- Gaps in Knowledge

# Construction

- Hauling, Placement & Compaction
- Control & Specs
- Gaps in Knowledge

# Day 3 – Synthesis & Summary

- Best Practices – $T^2$
- Gaps in Knowledge
- Research Needs
  - Long- & Short-Term
- Roadmap
  - Funding
  - Timetable

# How Do We Prevent This?

# Seminar Summary

- Accomplishments
- Measures of Success
- What's Next?

# What's Next?

- Proceedings- Published by TRB
  - Papers & Presentations
  - Roadmap
- Tech Transfer
  - Caltrans-sponsored 1-day Seminar (Developed by UCB-ITS)
  - Others - to Be Identified During Seminar