

# Long life Pavements for the Future



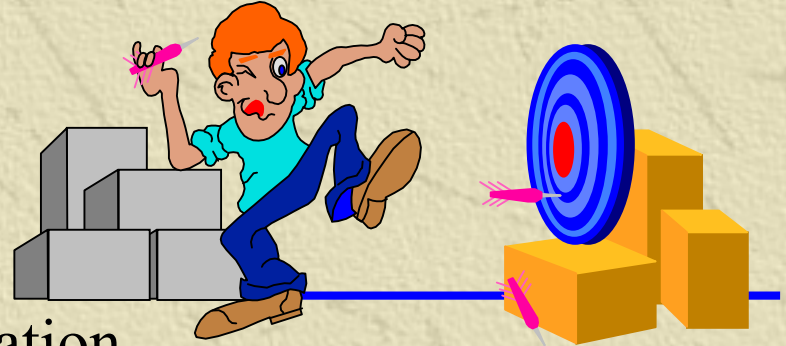
John D'Angelo  
Office of Pavement Technology  
NCAUPG Jan. 28, 2004

# Highway Pavements R&T

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## ✦ Critical issues

- Pavements are the backbone of transportation.
- Growing expectations of the highway user for smoother ride and reduced delay and disruption.

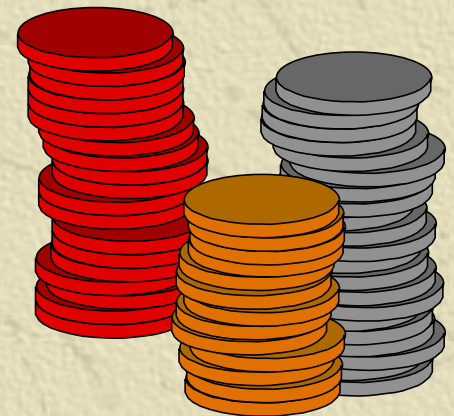


# Long Life Pavements for the 21<sup>st</sup> Century

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## ✦ Critical issues

- ✦ “Just in time” delivery has increased from 10% in 1990 to over 60% in 2000.
- ✦ Of every dollar invested in highways more than 50 cents goes to pavements.



# Long Life Pavements for the 21<sup>st</sup> Century

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## ✦ Critical issues



- ✦ Most of the NHS pavements were constructed in the 1960-70's.

# Long Life Pavements for the 21<sup>st</sup> Century

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## ✦ Critical issues

- ✦ From 1970 to 1998 average daily traffic volume has increased 130%. Average daily loading has increased 580%.
- ✦ Average freight loading is currently increasing at 2.7% per year.

# *Traffic*



# Long Life Pavements for the 21<sup>st</sup> Century

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## Critical issues

- ◆ Over 7,000 miles of urban Interstate currently need replacement and an additional 5,000 miles within 5 years.
- ◆ Over 13,000 miles of the rural National Highway System, NHS, require immediate attention

# Long Life Pavements for the 21<sup>st</sup> Century

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## ✦ Plan

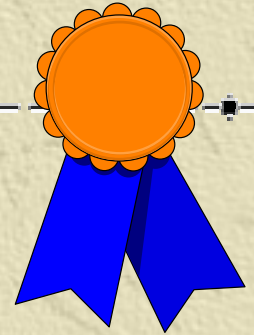
- ✦ The Long Life Pavement Technology Program would *demonstrate through actual pavement construction, innovative design practices, innovative materials, recycled materials, and improved equipment, for the rehabilitation, repair, reconstruction and building of new pavements throughout the country.*



# Long Life Pavements for the 21<sup>st</sup> Century

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## Key Components:

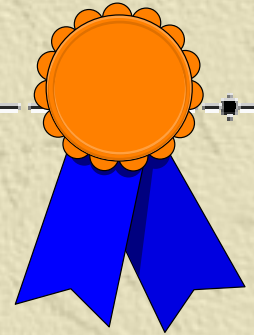


- ◆ Innovative Designs for longer life pavements – start with AASHTO 2002
- ◆ New materials and materials characterization techniques.

# Long Life Pavements for the 21<sup>st</sup> Century

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## Key Components:



- ◆ Less disruptive construction and maintenance technologies and technologies to reduce user delay while maintaining service and securing work zone safety.

# Long Life Pavements for the 21<sup>st</sup> Century

Key Components:

- ◆ Innovative Contracting
  - PRS & Warranties
- ◆ Pavement Evaluation Techniques

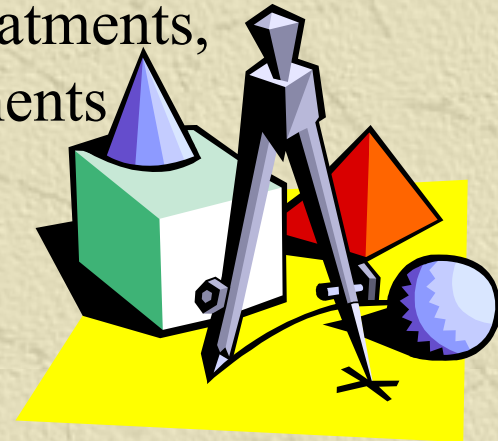


# Long Life Pavements for the 21<sup>st</sup> Century

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## ✦ Innovative Designs for longer life pavements – start with AASHTO 2002

- Procedures for the design/analysis of new and rehabilitated pavement systems
- Procedures for evaluating existing pavements
- Recommendations on rehabilitation treatments, subdrainage, and foundation improvements



# Long Life Pavement

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✦ Structure Lasts 50+ years.

- Bottom-Up Design and Construction
- Indefinite Fatigue Life

✦ Renewable Pavement Surface.

- High Rutting Resistance
- Tailored for Specific Application

✦ Consistent, Smooth and Safe Driving Surface.

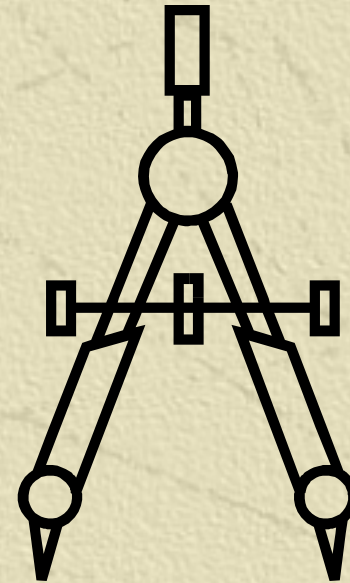
✦ Avoids Costly Reconstruction.

# Long Life Pavements for the 21<sup>st</sup> Century

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## ✦ FHWA role in implementation

- ✦ Training
- ✦ Technical Assistance
- ✦ Field Demo's



# Long Life Pavements for the 21<sup>st</sup> Century

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## ✦ FHWA role in implementation

### ✦ Training

- National Design Course Train the Trainer
- NHI Classes



# Long Life Pavements for the 21<sup>st</sup> Century

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## ✦ FHWA role in implementation

### ✦ Technical Assistance

- Design Examples
- Materials Testing
- Computer Assistance





# Design Guide Implementation Team Mission

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Inform, educate and assist  
FHWA's customers and partners  
in their implementation of  
the new Design Guide.

# FHWA Design Guide Implementation Team

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- ✦ Timothy Barkley, Communication Specialist, RC
- ✦ Leslie Myers, Office of Pavement Technology
- ✦ Katherine Petros, Infrastructure R&D
- ✦ Monte Symons, Resource Center
- ✦ Sam Tyson, Office of Pavement Technology
- ✦ Division Representative – TBD

# Workshops

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## ✦ Overview Workshops

- ✦ Introduction to design Guide
- ✦ Discussion of Initial Implementation Issues

## ✦ Materials/Design Workshops

- ✦ Materials Testing Requirements
- ✦ Discussion of Implementation Issues

## ✦ Small Working Session

- ✦ Addressing Individual Local Issues

# Workshops Details

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## ✦ Introduction Workshop

- ✦ Pilot Introduction Feb/Mar in Atlanta – RC
- ✦ Additional 4-6 through 2004
  - Projected Attendance 50-75 per session
  - Locations to be determined

## ✦ Materials/Design Workshop

- ✦ Pilot in NE June/July
- ✦ Additional 4-6 to be Scheduled in FY-05

# Training

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- ✦ NHI 131064 Introduction to Mechanistic Design – Available
- ✦ NHI 151018 Application of Traffic Monitoring Guide – Available
- ✦ NHI 132040 Geotechnical Aspects of Pavements – Pilot March 2004
- ✦ NHI XXXXX – 2002 Design Guide – Awaiting release of NCHRP 1-37A materials

# Pavement appears severely distressed

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# Crack at inside of left wheel path

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# Long Life Pavements for the 21<sup>st</sup> Century

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- ✦ New materials and materials characterization techniques.
  - NCHRP 9-19 simple performance test
  - AASHTO 2002 procedures
  - Use of recycled materials



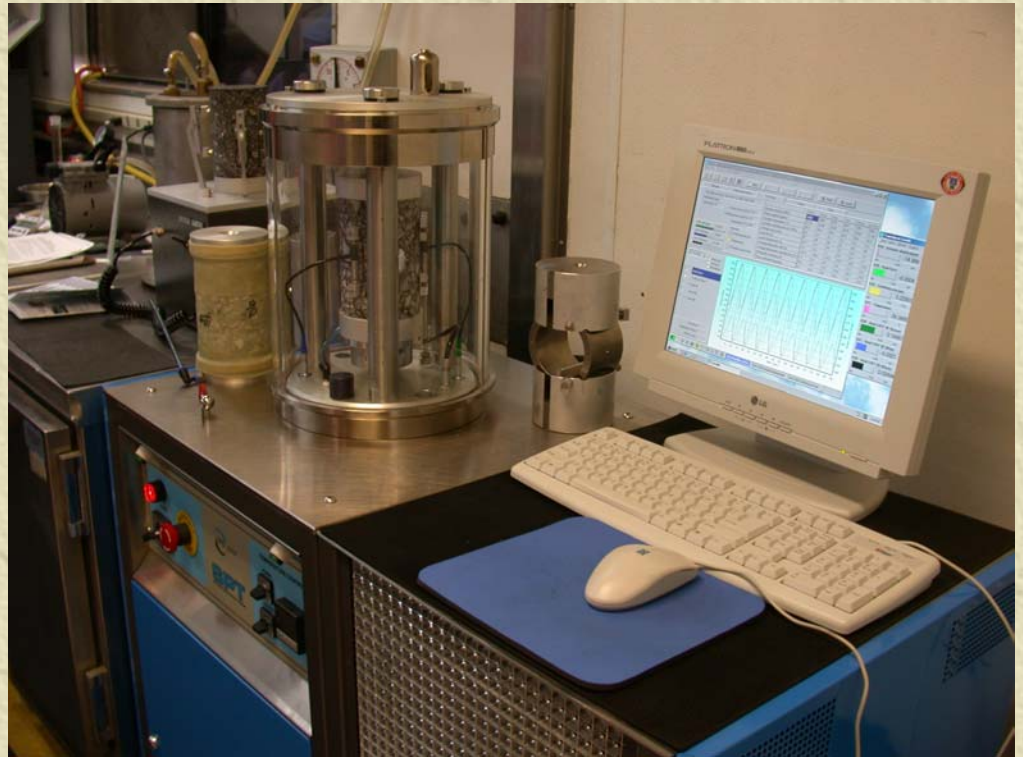


# Simple Performance Testing

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## ✠ Field trials of SPT

- Lab prepared
- Production mix



# Construction Technology

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✦ Improved paving techniques.

- Density

- Smoothness

✦ And reduction in delays.



# Construction Technology

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✦ Improved paving techniques.

- Night paving
- Safety



# Construction Technology

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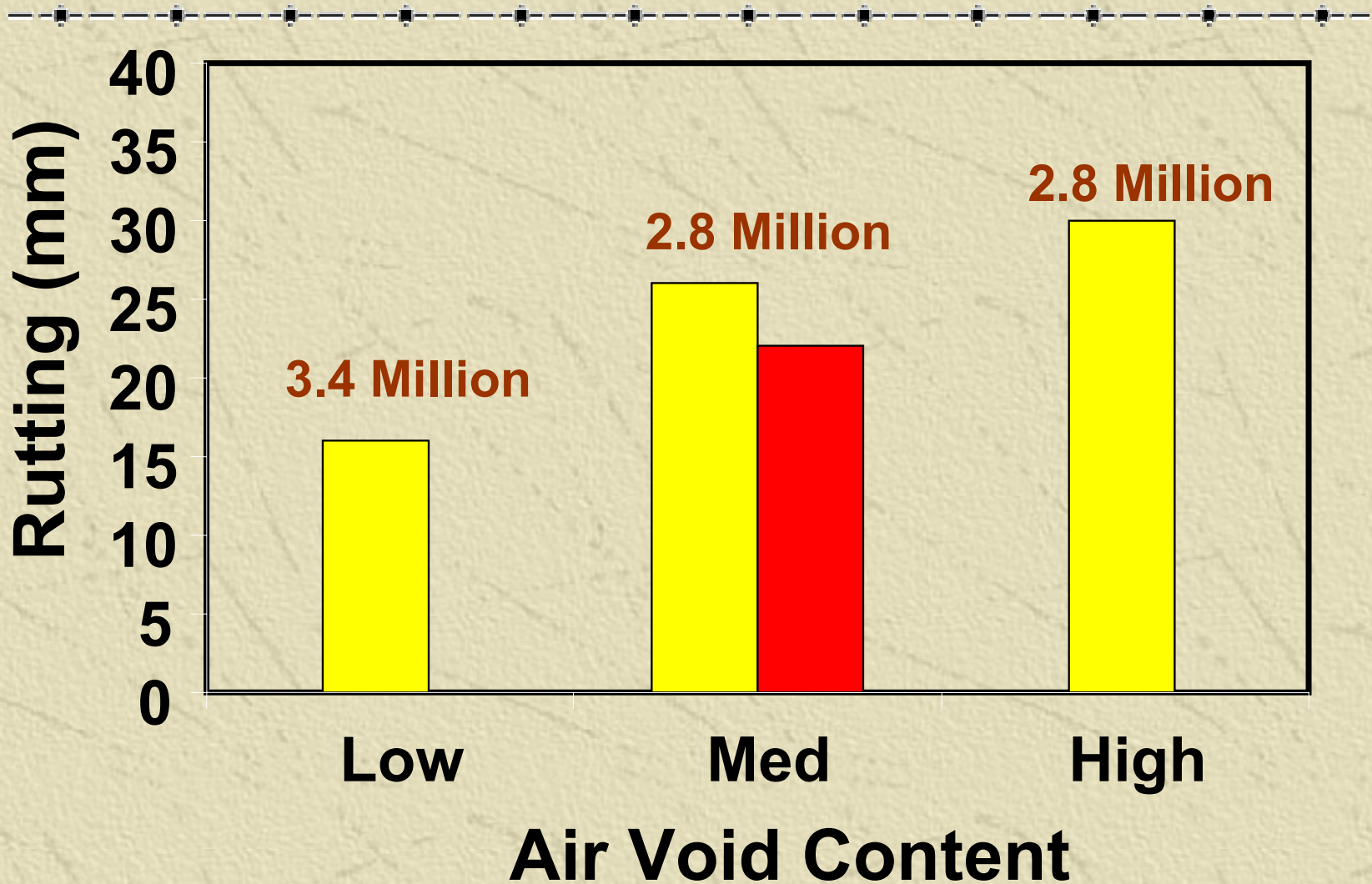
## ✦ Improved paving techniques.

- Compaction
- Lift Thickness
- Aggregate size



# WesTrack Mix

## Coarse at Opt. AC Content



# Innovative Contracting

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Performance Related Specifications are specifications that. . .

- ✦ Identify key A cceptance Q uality Characteristics (AQC) that relate to product performance.



# Innovative Contracting

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PRS use mathematical models to relate AQL's

- ✦ To distresses and product performance
- ✦ To life-cycle cost analysis (LCCA) . . .
- ✦ To determine one overall price adjustment for a lot.



# Innovative Contracting

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## ✦ Warranties

- ✦ Shared responsibility between the owner and builder.
- ✦ Promotes innovative design and construction
- ✦ Transfer responsibility for performance from owner to builder.
- ✦ Sets Life Expectations





# Pavement Evaluation Techniques

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✠ We will need to improve equipment and procedures for rapid and accurate evaluation of the pavement structure.



# Long Life Pavements for the 21<sup>st</sup> Century

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## ✦ FHWA role in implementation

### ✦ Field Demo's

- Equipment Demo's
- Pavement Evaluations



# Long Life Pavements for the 21<sup>st</sup> Century

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## ✦ Results of the program

- ✦ New technology on the design and construction of long life pavements delivered to the states.
- ✦ Advancement in construction techniques to reduce delays during construction.
- ✦ Construction of actual pavements demonstrating long life paving techniques.



# Hot-mix Construction Issues

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- ✦ NAPA and FHWA to sponsor regional Workshops.
  - ✦ Tied to User/Producer Groups.
  - ✦ Small groups
  - ✦ What are problems and how have they been handled.
  - ✦ Questionnaire to be sent out this winter.
  - ✦ Workshops next round of U/P meetings.

# Questions?

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