

Pavement Smoothness Overview

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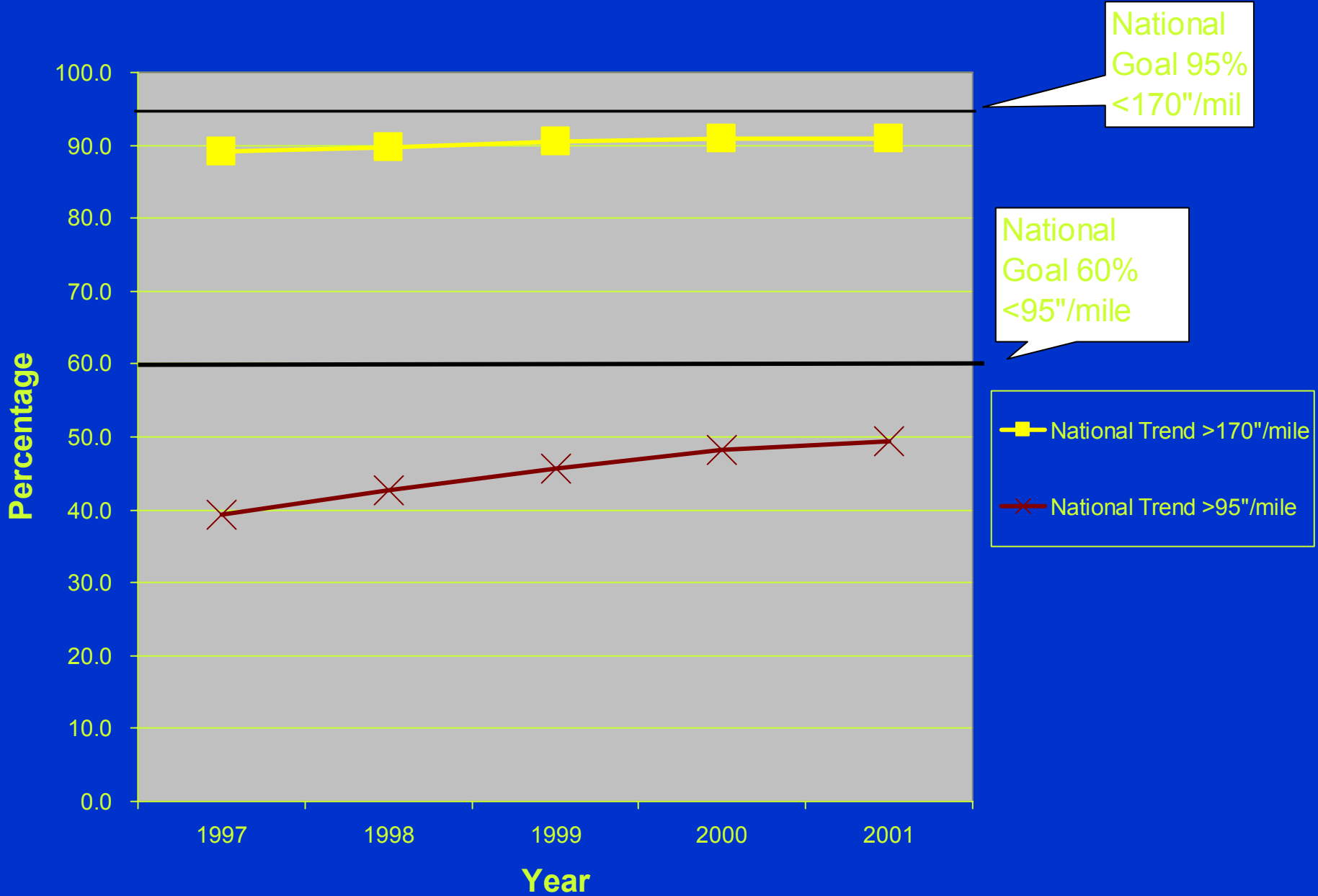
Presentation Overview

- National Pavement Condition Goal
- Profiler Demonstration
- Guide Specification
- Profile Index Relationship Report
- Best Practices Guides
- Profile Viewer Software
- Related Activities

Pavement Smoothness Goal

95% of the travel on the NHS will be on roads with IRI of 170"/mile or less

NHS Pavement Condition



Profiler Demonstration



Profiler Demonstration

- Conducted in 1999
- Ten States participated
- Lightweight profilers showcased
- Project criteria
 - compare at least three light weight profilers
 - conduct at least five replicate tests

Overall Conclusions

- Repeatability
 - Generally devices achieved good repeatability
 - One device in each demonstration did not demonstrate repeatability
 - Longer test lengths: better results

Overall Conclusions

- Reproducibility
 - Not demonstrated

Overall Conclusions

- Owner Agency Tests
 - lightweight profilers adequate if not comparing results
- QC/QA Specifications
 - Lightweight profilers not adequate without further work
 - test method
 - validation
 - equipment certification
 - operator certification/training

Need for Guide Specification

- Repeatability
 - can be improved
- Reproducibility
 - Not demonstrated in Profiler demo
 - Critical for implementation

Guide Spec Components

- Smoothness Specification
- Test Method
- Equipment Specification
- Equipment Certification/Calibration
- Operator Certification

Smoothness Specification

- Inertial profilers
 - lightweight
 - high speed
- Index IRI
- Full Pay 60-65"/mile, min30, max95
 - over 95 correct to 60
- Localized roughness
- Continuous function I/D

Test Method

- Verification (daily)
 - Height sensor
 - Bounce test
 - Establish Control Section
 - DMI check
 - IRI on control section
- Log of Verification

Test Method

- Operation speed critical
- Lead-in to test section
- Number of traces
- One sensor devices (MRI & HRI)
- Resolution of disputes
- File format

Equipment Specification

- Low speed (5-20 mph)
- High speed (20-70 mph)
- Automated triggering recommended
- Measuring IRI from 5-300 in /mile
- DMI accuracy of 0.1%
- Height sensor resolution 0.001 in.
- Reporting interval of 2 in.

Equipment Certification

- Tests
 - height sensor
 - DMI
 - Bounce test
- 10 runs on reference section
 - profile precision
 - profile accuracy
 - IRI precision
 - IRI accuracy

Equipment Certification

- Reference Profile
 - 4.75 in sample interval
 - established using rod and level, Dipstick, etc
 - 528 feet plus lead-in
- Certification for specific device

Operator Certification

- Training required
 - specific equipment (manufacturer)
 - profiling practices (NHI course)
- Written and practical test
 - smoothness specification
 - profiler calibration/verification
 - profile data collection
 - profile evaluation

Status

- Published as a Provisional Standard
June 2003
- Refinements underway

Smoothness Index Relationships Report

- Assists States transition to IRI or $PI_{0.0}$ specifications
- Utilized 40,000 LTPP Profiles
- Computed IRI, Simulated PI
- Converted existing specifications

Best Practice Guides

- HMA Smoothness Best Practice Guide
- PCC Smoothness Best Practice Guide
 - Measuring and specifying smoothness
 - Constructing smooth pavements
- Currently Available

Profile Viewer Software (ProVal)

- Profile Viewer 1.0
 - Software to View and Analyze Profile Data
 - Features
 - IRI
 - PI
 - Power Spectral Density (PSD)
 - Cross-Correlation
 - Standard file format
 - Future development.....

Related Activities

- Profiler Pooled Fund Project
 - 15 states and FHWA participating
 - Detailed presentation June 24, 1:45 pm
 - Contact: Bob Orthmeyer

Related Activities

- Smoothness Criteria for Concrete Pavement
 - FHWA research contract
 - Determine objectionable profile characteristics
 - How smooth is smooth enough?
 - Localized roughness
 - Contact: Mark Swanlund

Questions?

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