CAPA / NCDOT Asphalt Training Workshop
February 21-22, 2012
Raleigh, NC

NCDOT – “Final Surface Testing”

IRI Standard Specification

Article 610-13
2012 Standard Specifications
In Standard Specifications forever!

Standard 10 Ft. Non-Mobile Straightedge
Article 610-12 of 2012 Standard Specs.
1996 - Smoothness Committee was appointed by the Secretary of Transportation.

- Charged with researching other methods in addition to the Non-Mobile Straightedge for checking Pavement Smoothness
- Develop a Project Special Provision for the new method which became the Hearne Straightedge (10’ Rolling Straightedge).
National Highway User’s survey in 1996 indicated that nationwide pavement conditions were the No. 1 concern of traveling public.

Rideability Specification developed for 5 projects let in Nov. 1996.
• Full implementation considered for 1997
• Pavement Smoothness Task force was established
• June 2005 – Memo on Rideability (still an issue)
• Rideability Group was established with Industry Reps.
NCDOT - Ride Quality Background

- Final Surface Testing SP (2 or more lifts of asphalt, 45 mph, 1000’)
- Hearne Straightedge – Asphalt Pavement
- Rainhart Profilograph – Concrete Pavement
Hearne Straightedge –
Developed in NC by Tom Hearne
Hearne is a 10-ft Rolling Straightedge pushed at 2 mph
Graph produced by Hearne Straightedge
Graph produced by Hearne Straightedge
Hearne Straightedge

Index Numbers

- **Straightedge Index (SEI)**
  - Indicates deviations that exceed 0.2 & 0.3” blanking band within a 100 ft. test section

- **Cumulative Straightedge Index (CSI)**
  - Represents total SEIs for one lot, which consists of not more than 25 consecutive test sections
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**Note 1:** Resident Engineer to furnish gold copy to NCDOT Unit upon completion of Federal Aid Projects only.

**Note 2:** Contractor must be notified by letter of any Pay Adjustments or Corrective Actions.

**CS1**

*Print Name Legibly*

*Evaluator’s Signature:

“BY PROVIDING THIS DATA UNDER MY SIGNATURE AND/OR RAS Number, I attest to the accuracy and validity of the data contained on this form and certify that no deliberate misrepresentation of test results, in any manner, has occurred.”

cc: Resident Engineer, Pavement Construction Engineer, District Engineer, Resident Engineer (See Note 1)

Remarks:

Resident/District Engineer:
Rainhart profilograph for concrete pavements and bridges

This is an Asphalt Workshop…moving on!
Issues with Profilographs

- These “contraptions” are slow (2 mph)
- Can take multiple runs to complete
- Traffic control issues (lane closures)
- Results are subjective (graphs on paper)
- Not a true profile of roadway
Fast forward to 2011…

**IRI!**

*International Roughness Index*

Pavement smoothness measured with Laser Profiler mounted on a vehicle (Deviations Measured in Units = in/mile)
Mounted on Golf carts…
Vehicles < 30 mph

SUVs, Vans, Pickups…
Vehicles up to 70 mph
Laser Profiler Setup

- NCDOT – Pavement Management Unit has profiler equipment and has been measuring IRI for years on our Interstates
- PMU has 4 profilers (Single 5-Pt lasers – can go to 7)
- 2 DynaTest and 2 ICC
RoLine and TriODS sensors mounted on lightweight profiler.
NCTA hired Consultant to perform IRI testing

NCTA had an IRI spec on WWF and Monroe projects
NCTA used 65 in/mile on asphalt and 75 in/mile on concrete
NCDOT - IRI Development

- 2008 – NCDOT had pilot project w/ Percent Improvement SP
- 2011 - NCDOT developed draft IRI Spec
- Received Industry input on draft IRI spec
- Reconvened Rideability group for asphalt
- 2012 – NCDOT implemented Standard Specification for IRI
- Intent - Use IRI spec for new location construction (Bypass are ideal)
NCDOT – IRI Specification Details

- For asphalt, still include Hearne as an option (Option #2 - 2012 Standard Specifications)

- Contractor performs smoothness testing or hires a firm

- In 2010, AASHTO documents on Inertial profilers and systems were updated and finalized

Article 610-13 … 2012 Specifications
In August 2003, the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Materials (SOM) adopted Provisional Standards to address these needs, which were further revised between 2007 and 2010 as the following full standards:

M 328-10 Standard Specification for Inertial Profiler

R 54-10 Standard Practice for Accepting Pavement Ride Quality when Measured Using Inertial Profiling Systems

R 56-10 Standard Practice for Certification of Inertial Profiling Systems

R 57-10 Standard Practice for Operating Inertial Profiling System
• For asphalt, still include Hearne as an option (Option #2 - 2012 Standard Specifications)

• Contractor performs smoothness testing or hires a firm

• In 2010, AASHTO documents on Inertial profilers and systems were updated and finalized

Article 610-13 … 2012 Specifications
NCDOT – IRI Specification Details

- Need calibrated profiler and trained, competent personnel using the system
- Use low-speed or high-speed profiler
- Run profiler on both wheel paths at same time
- Will allow separate runs...one per each wheel path

Article 610-13 ... 2012 Specifications
NCDOT Specifications require use of Line Laser technology

Sensor footprint of the RoLine and TriOD sensors.
Line Laser Technology

PaveMetrics LCMS with Accelorometer to collect IRI values
NCDOT – More details on IRI Specification

- Data provided to RE after each run on approved media (CD, DVD, flash drive)
- DOT will analyze raw data on FHWA ProVAL software
- DOT can do QA to verify data with PMU profilers
NCDOT – More details on IRI Specification

• Contractor provides results report - 10 days after completion of smoothness testing

• IRI numbers for 0.10-mile sections (MRI is average of IRI numbers from both wheel paths)

• NCDOT – Same numbers for both pavement types w/ acceptance range from 55-70

• Pay Incentives / Adjustment “continuous” formulas
**NCDOT – Pay Adjustment Chart**

- Price adjusted based on MRI numbers per lane
  - 45.0 or under  \( PA = $200 \text{ per } 0.10 \text{ mile} \)
  - 45.1 to 55.0  \( PA = 600 - (10 \times MRI) \)
  - 55.1 to 70.0  Acceptable (No PA)
  - 70.1 to 90.0  \( PA = 650 - (10 \times MRI) \)
  - Over 90.1    Corrective Action Required

- Corrective action must be approved by RE

- Areas of Localized roughness (>125.0 in 25’)

**State of North Carolina Department of Transportation**
Project Criteria

• Implementation on projects in 2012

• Criteria when Final Surface Testing applies:
  – 1) Facility is 45 mph or greater
  – 2) Length is 1 mile or greater
  – 3) Must have 2 lifts of asphalt pavement
Questions / Comments?