Implementing (Bleeding) Standards for Pavement Data Collection

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About the Presenter

• Rick Miller
  ▪ Kansas Department of Transportation – Pavement Management Engineer
    • Since 1998
  ▪ Statewide Planning Engineer/Associate
    • 1988-1998
  ▪ Active in TPF-5(299) Improving the Quality of Pavement Surface Distress and Transverse Profile Data Collection and Analysis (2013 - Present)
  ▪ Active in Expert Task Group for Rutting and Cracking (2008 - 2013)
  ▪ Active Opponent of National Pavement Data Collection Standards (1998 - ?????)
Uses of Pavement Condition Data

- Reports (Annual NOS, HPMS)
- KDOT Performance Measures (% Good)
- Project Selection
  - "Major Mod" Prioritization (Major Rehab/Recon)
  - "Substantial Maintenance" Optimization (Rehab/PM)
- Pavement Design, Research, other stuff
Data KDOT Collected

- Roughness (IRI) (all pavement types)
- Cracking (Transverse, Fatigue, Block) (Black surface)
- Rutting (3 point) (Black surface)
- Joint Distress (“D-Cracking”) (White surface)
- Faulting (White surface)
- Location (GPS) Data (all pavement types)
KDOT Methods of Data Collection

- Automated (60 or more MPH)
  - 3 point profiler (roughness, rutting, faulting)
  - Nearly 100% sample of each segment
  - DGPS

- Manual (5-10 MPH in 100 foot sections)
  - “Windshield” (cracking, joint distress)
  - Three 100 foot samples per (nominally 1 mile) segment (~5% sample)
“New” Requirements To 2013 and Beyond….

- KDOT – adapt new data to fit old criteria and/or shift to new data
- AASHTO – Produce data “exactly” following the published standards (full disclosure of ETG)
- HPMS – Produce data following the standards (if the standards don’t make sense, get them changed!)
Data KDOT Collects

- Wheelpath Profiles
- Forward Images
- Transverse Profiles
- Downward Images
4.0 m minimum
4.25 m preferred

2-D

3-D
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<td><strong>Collecting Images of Pavement Surfaces for Distress Detection</strong></td>
<td><strong>Quantifying Cracks in Asphalt Pavement Surfaces from Collected Images Utilizing Automated Methods</strong></td>
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Automated Crack Detection

- What are the dimensions of the smallest crack of interest?
- What meta data do we need regarding cracks?
  - Location
  - Extent
  - Width
  - Orientation
  - Etc.
- How should we report cracking?
Cracking Analysis Standard

- Uses 5 zones
- Classifies into 3 types
  - Longitudinal
  - Transverse
  - Pattern/Area
- Total length(s) and Average Width(s)
Applying the cracking standard
Not 2 cracks but more like 13
Not just transverse either
Pattern in the mix

Only these pieces of the larger crack 1 FAIL to meet the +/- 10 degrees perpendicular to centerline requirement. So, those that fail (<=0.1836 m) count as pattern and the rest (>=0.7266 m) count as transverse.
AASHTO Standard crack outputs

- Length of Cracks
  - By Zone
  - By Type
- Average Width
  - By Zone
  - By Type
Is that enough info?

- Kansas says okay for Transverse and Longitudinal
  - (would like more info like detailed transverse)
- May need more for Pattern
Is that enough info?

- Kansas says okay for Transverse and Longitudinal
  - (would like more info like depressed transverse)
- May need more for Pattern
  - (area may be needed to make pattern meaningful)
- Need to do Some Math for Block
- May Need to Repeat for Sealed Cracks
Rick’s suggestions

- Standards are a Good Start
- Twist Our Brains Around Definition of Crack
- Apply Output from Standards
- Better Define Zones
- Address Area for Pattern Cracks (maybe transverse too)
- Incorporate Sealed Cracks Better
Questions?
KS automated experience

Items Suggested to Asses in Existing AASHTO Provisional Standards and KS Verification – Miller, KS
2012 NOS vs 2013 RSP IRI

2012 NOS IRI vs 2013 RSP IRI Values
070U0005600S0EB

Milepost

International Roughness Index (in/mile)
Comparing Transverse Cracks

2012 NOS TCR1+2+3 vs 2013 LCMS Transverse Crack Values
070U0005600S0EB

Number of Transverse Cracks per 100 linear feet

Milepost

- CountTCR1+2
- Z1-5TCR/12/52.8
2012 NOS Sealed Transverse vs LCMS Sealed Cracks

2012 NOS TCR0 vs 2013 LCMS Sealed Crack Values

070U0005600S0EB

Number of Sealed Transverse Cracks per 100 linear feet

Milepost
Fatigue Cracking Comparison

2012 NOS Fatigue vs 2013 LCMS Zone2+4 Crack Values
070U0005600S0EB

Wheelpath Feet of Fatigue Cracking per 100 linear feet

Milepost

FCR1
(LongZ2+Z4)/52.8*2
Lessons Learned?
Title

• Content Level 1
  ▪ Content Level 2
  • Content Level 3
Presentation Topics

• **(Bleeding) Standards**
  - PP-68 “Collecting Images of Pavement Surfaces for Distress Detection”
  - PP-67 “Quantifying Cracks in Asphalt Pavement Surfaces from Collected Images Utilizing Automated Methods”
  - PP-70 “Collecting the Transverse Pavement Profile”
  - PP-69 “Determining Pavement Deformation Parameters and Cross Slope from Collected Transverse Profiles”
  - HPMS

• **Implementation**
  - Kansas Pavement Management History

  ▪ Content Level 2
    • Content Level 3
Title

• Content

• Content
Following Standards

- AASHTO R 43 Quantifying Roughness
- AASHTO R 48 Determining Rut Depth
- AASHTO R 36 Evaluating Faulting
- AASHTO PP 68 Collecting Images of Pavement Surfaces
- AASHTO PP 67 Quantifying Cracks from Images
- AASHTO PP 70 Collecting the Transverse Profile
- AASHTO PP 69 Determining Pavement Deformation from Transverse Profiles
Following Standards

- AASHTO R 43
- AASHTO R 48
- AASHTO R 36
- AASHTO PP 68
- AASHTO PP 67
- AASHTO PP 70
- AASHTO PP 69
- Quantifying Roughness
- Determining Rut Depth
- Evaluating Faulting
- Collecting Images of Pavement Surfaces
- Quantifying Cracks from Images
- Collecting the Transverse Profile
- Determining Pavement Deformation from Transverse Profiles