Automated Crack Detection

Presented by:
Ashley Horne, LA DOTD
Jason Trotter, Fugro Roadware
Automated Crack Detection

- Past Methods of Crack Detection
- Human Ratings Creates Subjective Ratings
- Automated Crack Detection
- Lessons Learned
- Questions
Automated Crack Detection

Past Methods of Crack Detection

- Estimated Quantities of Cracking
- Done at Highway Speed During Collection
- Some Post Processing Required
- Very Difficult to Verify Cracking Quantities
Automated Crack Detection

Past Methods of Crack Detection – cont’d

Video Rating (V-Rating) – 1996 & 1998
- Required Specialized Equipment
  • Custom Key Board (Rater Board)
  • Massive Work Station
  • S-VHS Tapes
- Estimated Cracking Quantities
- Difficult to Verify Cracking Quantities
Automated Crack Detection

Past Methods of Crack Detection – cont’d

Digital Rating (D-Rating) – 2000 thru 2006
- Rater Drew Lines to Mark Cracking
  - Longitudinal Cracking
  - Transverse Cracking
  - Fatigue Cracking
- Rater Drew Boxes to Indicate Areas of Patching
- Different Colors to Represent the Various Severities
  - Green – Low Severity
  - Yellow – Medium Severity
  - Red – High Severity
- Disadvantages
  - Path of Cracking Usually Was Not Followed Closely
  - Time Consuming
Automated Crack Detection

Human Ratings Creates Subjective Ratings

- Train Approximately 50 raters
- Outsourced for 2006
  - Majority of Distress Rating Done in India
  - Remainder of Distress Rating Done in Canada
- Raters Worked in Three Shifts
  - 8 Hours Per Shift
  - 5 to 6 Days Per Week
  - 24 Hours Per Day
Automated Crack Detection

Human Ratings Creates Subjective Ratings – cont’d

- Inconsistency Between Raters
  - Each Rater Tested and Compared
  - Crack Width Estimated to Determine Severity

- Interpretation of Protocols
  - Distress Type
  - Distress Severity

- Introduction of Human Error
  - Fatigue
  - Missed Distresses
Automated Crack Detection

2008 – 2009 Data Collection

- Minimize Subjective Ratings
- Ability to Confirm Quantified Distress Data
- Repeatable Results Across Multiple Computers
- Emphasis on High Quality Data
Automated Crack Detection

WiseCrax

- Cracking distress only
- Batch processing of data
- Used on asphalt surfaces
Automated Crack Detection

Cracking Types

- In WX, there are 3 distress types:
  - LONG
  - TRANS
  - GATOR
Automated Crack Detection

Distress Pilot

- 100-mile pilot was selected from D61 to allow detailed validation of distresses, visualization, and QC methods
Automated Crack Detection

Csect 077-02 (ASP)

077-02 ALCR Comparison 2007 to 2008 (ASP)

077-02 RNIDM Comparison 2007 to 2008 (ASP)
Automated Crack Detection
Distribution of index value changes
District 61 - Pilot Delivery

ALCR Distribution
- Increased >5: 19%
- Within +5 to -10: 19%
- Decreased >10: 62%

RNDM Distribution
- Increased >5: 19%
- Within +5 to -10: 13%
- Decreased >10: 68%
Automated Crack Detection

Distribution of index value changes

District 61 - Final District 61

Y2Y Alligator Index (on ASP)

-15 < X ≤ 5: 85%
5 ≤ X: 14%
X ≤ -15: 1%

Y2Y RNDM Index (on ASP/COM)

-15 < X ≤ 5: 91%
X ≤ -15: 2%
X ≥ 5: 7%
Automated Crack Detection
Automated Crack Detection

Lessons learned...

- Consultant/Client Relationship is key
- Change in process or protocol must be tested in a pilot project
- Change is sometimes required to take the next step in continuous improvement
- Be open to input