Colorado Department of Transportation

Quality Control Checks of Distress Data

Acknowledgments

The presentation and the process represented were prepared by:

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- Scott Mathison - Pathways Services Inc., Project Manager for CDOT.

CDOT Distress Data Collected

- Annual Collection:
  - Divided- Direction 1 and 2
  - Other-Direction 1 only
- Annual Items: Cracking (transverse, longitudinal, fatigue, corner breaks); Rut; Ride; Video; HPMS Sections
- Ad Alternates: Curvature, GIS, Shoulder
- Not Collected: Friction, Depth, Structure, Raveling, Oxidation

CDOT Investment in ADC

- Automatic Data Collection (ADC) has been done by CDOT since 1999 with vendor.
- Pavement Management Program (PMP) is ~ $2,000,000 per year:
  - ADC Cost- ~$450,000 to collect ~11,500 Data Collection Miles.
  - ~$40-50,000 per year to maintain PM Software
  - ~ 6 to 7 FTEs, Staff and Regions
- Quality data is baseline for a successful pavement management program. Key to site specific and family curves.

Challenges with ADC

- Statistically significance sampling of subjective data is not practical or realistic.
- Short time frame to collect (January to July)
- Limited review period (July-August) prior to reporting to the Transportation Commission
- 11,500 DCM collected each year
- Credibility
  - Consistent Reporting- PMP (RSL) vs Maintenance (LOS), this can confuse public and policy makers
  - Policy and Public focused on 2-3 segments

Desirable Characteristic

- Consistent
- Repeatable
- Verifiable with software, visual and field checks
- Timely

Vendor Requirements

- CDOT uses the same vendor to collect data each year (five year contracts)
- Data is collected in the same manner each year
  - Consistency of the equipment used, vendor sets up van specific to CDOT requirements
  - Same collection team (not a contract requirement)
- The Vendor Quality Control Plan is reviewed in detail, commented on and modified to CDOT specifics.

CDOT - Quality Control Checking Two Major Checks

- Correlation sites
- Batch Data Checking
  - Data base checks
  - Distress checking using visual review of image files
  - Checks by region personnel (region pavement managers)

Correlation Sites - Descriptions

- Ten correlation sites (throughout the state)
  - Five HMA
  - Five PCCP
  - One speed site
    - Two runs at 25, 35, and 45 mph
  - One combo site (HMA to PCCP)
  - One urban (signals almost every block, stop and go)
- Lengths
  - 1.1 miles shortest
  - 2.7 miles longest

Correlation Site - Collections

- Correlation sites run three times per year
  - Prior to data collection
  - Midpoint
  - Three-quarter point *

Correlation Runs - Description

- Five runs on each site
  - Reduced to three runs for mid and ¾ for 2010
- Data collected/reviewed
  - IRI
  - Rutting , left and right
  - Faulting
- Reported each 1/10 mile

Evaluation

- Review standard deviations
- Mean
- **REPEATABILITY**
- Comparison to previous years data
- Compared to runs in the same year

Results are relayed back to contractor

Software Batch Data Checks

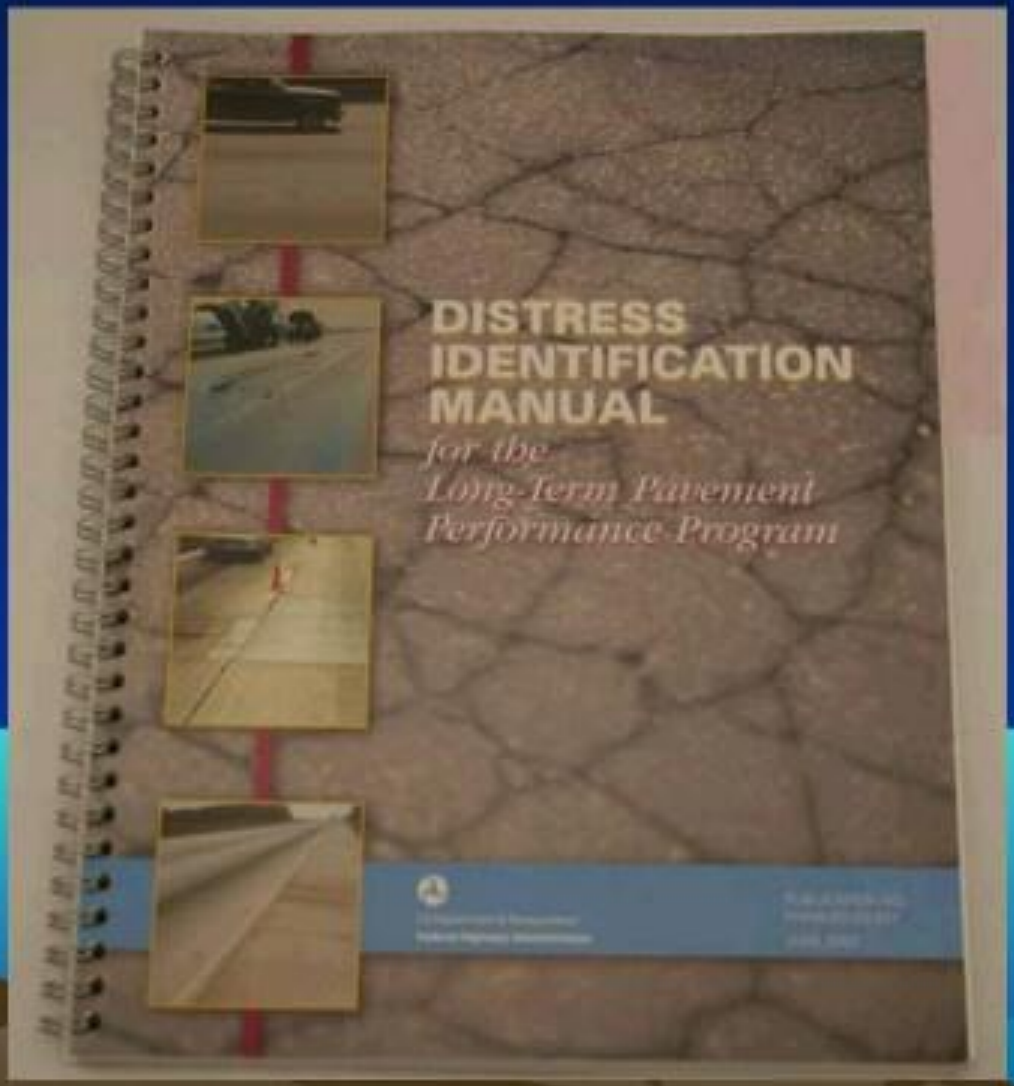
- Data base query checks
  - Each distress has ranges, every cell is check against the ranges and flagged if out of range
  - Back check to previous years results, if improving then distress if flagged
  - Baseline data verified against master inventory
- Specific Checks:
  - Missing data
  - Data format errors
  - Pavement type errors
    - Checked manually using image files
    - Intersections, bridges, and patches
    - Measurement, changes that occur in the middle of a segment
  - Repeating values
  - Values considered Out-of-Range
  - Missing segments
  - Repeated segments

Checking of Reported Distresses by Review of Image Files

Issues

- Image quality
- Rater qualifications
  - Training and experience

Information Resource



Visual Check of Distresses

- Checking reported distresses by evaluating the video image files
  - 10 Random Segments are rated using video by all CDOT PMs (6-7), results are compared to each other and to vendor.
- Field Checks are discouraged, primarily for safety reasons. Traffic Control is required.

Individual Batch Reviews (HQ and Region)

- Broken into three parts, segments with:
  - Low amounts of distress
    - Reported distresses close to zero, minimum
  - Medium levels
    - Mid range distresses
    - Also look for segments with significant changes
      - Usually patches or change in pavement type
  - High
    - Close to maximum possible values
      - Example: Fatigue at 100%, this is possible

Segments Reviewed

- Five to ten randomly selected segments in each of the three categories (low, med., high)
- One mile in length
  - Evaluating ten 1/10ths

Distresses Reviewed

- Fatigue, square feet
  - Low, Medium, High
- Transitional cracks, count
- Longitudinal cracks, linear feet
  - Low, Medium, High
- Corner breaks, count

Using *Distress Identification Manual for the Long-Term Pavement Performance Program*

Rating

- Agree
  - Less than ± 5% difference
- Mostly Agree
  - Less than ± 10% difference
- Concerns
  - Greater than 10% difference

Next Steps

- Formalize Process
- Update Manual
- Train Region Personnel
- Refine RFP, for next contract period, review process with other vendors
- Specific Rut and Ride Test Sites
- Structure and Depth Information
- Refine Data Collection Needs and Items
  - Reduce annual DCMs, eliminate direction 2
  - Add other items (Signs, culverts, structure, shoulder width, etc)

Thank You!

- Questions, Comments, Ideas, Recommendations, etc.
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