

TPF-5(299) Improving the Quality of Pavement Surface Distress and Transverse Profile Data Collection and Analysis Pooled Fund (PF) Study Meeting

May 6 and 7, 2014

Agenda and Minutes

**May 6**

8:30 am Purpose/History of Study and Attendee Introductions – Mergenmeier, FHWA – see presentation file and attendee sign in sheet.

Using following definitions:

Data Collection

**Manual surveys** – Manual surveys are conducted by walking or traveling at slow speed and noting the existing surface distress. Manual surveys may be limited to selected segments or span the entire roadway length. Distresses are generally recorded on paper, but there is an increasing trend to enter the survey results directly into computers or hand-held devices. Rut depth and/or faulting are typically estimated by taking manual spot measurements.

**Automated surveys** – Automated surveys typically incorporate the use of vans fitted with equipment (e.g., lasers, high-speed cameras, and computers) specifically designed for collecting pavement and roadway features. Digital images of the transverse and longitudinal profiles of the roadway surface are captured at highway speeds for use in assessing pavement condition. Data and images collected through automated surveys require processing using either fully or semi-automated methods.

Data Analysis

**Manual** – by default if manual data collection

**Semi-automated** – For semi-automated processing, the resulting images are viewed at workstations by personnel trained to rate visible cracks and other distresses.

**Fully automated** – Fully automated processing includes using the collected images and pattern recognition technology for automatically (i.e., no user interference) detecting distress.

Agency rutting data collection and analysis: Manual: GA, OH; Automated: AL, TX, NJ, OR, VA, SD, MS, ND, KS, WA, FL, MD

Agency cracking data collection: Manual: TX, NJ, GA, SD, OH, FL; Automated: AL, OR, VA, MS, ND, KS, WA, MD

Agency cracking analysis: Manual: TX, NJ, GA, SD, OH, FL; Semi-Automated: AL, OR, WA (this year will be automated), MD; Automated: VA, MS, ND, KS

Additional comments noted included concerns expressed regarding transitioning away from current state protocols (TX and NJ). Comments were also offered regarding the need for documenting the presence of patching (OR and SD).

9:30 am Study Charter and Project Management (Budget) – Mergenmeier, FHWA – see charter

10:00-10:15 am Break

10:15 am AASHTO PP 67, PP 68, PP 69 and PP 70 – Andrews, MD SHA – see presentation file

11:00 am KS experience with AASHTO PP's and automated data collection and analysis – Miller, KDOT – see presentation file

Noon – 1:15 pm Lunch (on your own)

1:15 pm Brainstorming of Potential projects:

AFD 20, Pavement Monitoring and Analysis and TRB AFD20 Subcommittee on Pavement Images – Andrews, MD SHA – see attached document

LTPP Data Collection Accreditation Workshop – Daleiden, Fugro-Roadware; PF voted to approve going forward with following action item. **Action Item:** team consisting of Daleiden (lead), Choubane, FL, George, AL, Keifer, Dynatest, to develop experimental plan for the June workshop. Goal is for results to be presented at next meeting of the PF.

3 – 3:30 pm Break

3:30 pm Brainstorming of Potential projects (continue):

Pavement Data Collection and Analysis at Pavement Evaluation Conference and RPUG – de Leon Izeppi and Ferris, VaTech; - see presentation files; Discussion included doing experiment at Smart Road and if possible nearby public road (such as Danville LTPP section). PF voted to approve going forward with following action item. **Action Item:** team consisting of de Leon Izeppi (lead), Ferris; Daleiden, Fugro-Roadware; McGhee, VDOT; Choubane, FL; Tsai, GaTech; Keifer, Dynatest; Richardson, Mandli; Huang, TX to develop experimental plan for September conference - assessing reference “plates” (need to be appropriate for system evaluation) using various materials and/or pavements. Pavemetrics indicated they have reference “plates”. Draft experimental plan due June 6.

4:30 pm End

## May 7

8:30 am Brainstorming of Potential projects (continue):

Potential Research Problem Statements from existing FHWA developed national Pavement Management System Road Map presented. Participants broke up into 4 groups to develop proposed projects/activities – 4 groups were: Image/Data Collection; Image Analysis; Transverse Profile Collection; Transverse Profile Analysis. Within the 4 groups the following are the proposed project/activities:

Image/Data Collection (George, Miller, Wang, Luhr):

- Development of standard image (data) format of pavement surface condition
- Data Compression Evaluation
- Image (data) viewer – like ProVal
- Concepts and requirements for calibration and QC/QA of data collection equipment and best practices for collection

Image Analysis (Fox-Ivey, Daleiden, Keifer, Bertucci, Rodriguez, Morse, Lunde, Harrison, Mathison):

- Needs assessment
  - What distresses do Agencies need for decision making?
  - Reporting desires/requirements?
  - Minimum image standard requirements?
- Gap Analysis
  - What is industry capable of?
  - What issues are we missing?
  - How do we address the gaps?
- Verification Studies
  - Evaluation of protocols as developed
- Precision & Bias Studies
- Implementation/Application evaluation
  - Calibration/Adjustments on State by state basis
  - Translation of protocols to existing State PMS practices
  - Seek/pursue Automation Opportunities
  - Seek/evaluate potential summary indices

Transverse Profile Collection (Mathews, Richardson, Owens, Tsai, Weigel, de Leon Izeppi, Botting, Wilson):

- Definition of end deliverables – where are we now? Where are we headed? Resolution, accuracy, tolerance of error
- Calibration procedure: width resolution, vertical resolution, DMI constant; Validation Procedure: know true horizon, vehicle orientation with respect to true horizon, rut depth accuracies, rut depth repeatability, percent error
- Data Format: metadata to be recorded, standard output file, standard validation template

## Transverse Profile Analysis (Coplantz, Smith, Huang, Choubane, Ferris, Wu, Andrews):

- Determine the information that should be transferred from the data collection process
  - Accuracy
  - Resolution
  - Data transfer formats
  - Geolocation of data points (Longitude/Latitude/Altitude, Easting/Northing/Altitude)
  - Definition of the centerline path and edges of pavement
  - Lateral (transverse) spacing, and longitudinal spacing
  - Format of data and metadata
- Accuracy assessment and calibration / Error detection and mitigation / QA QC
  - Methods of assessment, verification, and calibration
  - Accuracy requirements for different applications (network measurements vs project)
  - Methods to detect and correct/mitigate errors
    - Vertical error
    - Horizontal error
- Methods to define pavement characteristics
  - Rutting
    - Depth, volume
    - Lateral Spacing (multiple rut widths)
    - Methods to identify rut source from rut shape
  - Cross-slope
  - Needs assessment (characteristics other than rutting and cross-slope)
  - Water retention and drainage path simulation
  - Sensitivity of characteristics to number of points per transverse (lateral) profile
  - Discuss the appropriateness (robustness, validity) of existing standards (PP67-70), particularly PP-69
  - Methods to identify areas of concern (e.g., is there practical use of deformation index?)
  - (data viewer – idea stolen from Image collection)

10:30-10:45 am Break

10:45 am Finalize Charter – select Chairman; Charter revised and approved via motion by KS second by FL – unanimous vote by TAC to approve. Chairman: WA nominated Andrews, MD, motion by MS with second by FL – unanimous vote by TAC to approve Andrews as Chair.

Noon – 1 pm Lunch (on your own)

1:00 pm Prioritize Projects, Draft Project Statements

Project prioritize process was conducted – each participant 4 votes. Some combining of activities occurred. Resulted in developing research needs statement (RNS) type documents for:

Image/Data and Transverse Profile Collection:

- Development of standard image (data) format of pavement surface condition; Data Format: metadata to be recorded, standard output file, standard validation template; Determine the information that should be transferred from the data collection process
  - Accuracy
  - Resolution
  - Data transfer formats
  - Geolocation of data points (Longitude/Latitude/Altitude, Easting/Northing/Altitude)
  - Definition of the centerline path and edges of pavement
  - Lateral (transverse) spacing, and longitudinal spacing
  - Format of data and metadata

Image and Transverse Profile Analysis: needs assessment

Image and Transverse Profile: verification; and precision and bias studies

Image and Transverse Profile: implementation

See file for the 4 RNS. **Action Item:** Chair will select small group to review and refine RNS with a goal of developing project statements that will be put before the PF for voting for approving to conduct. The following volunteered to be considered for the small group: Keifer, Choubane, Daleiden.

3 – 3:15 pm Break

3:15 pm Assign Teams to Draft Selected Project Statements

3:45-4:00 pm Next Meeting – Adjourn

It is expected there will be a need to meet face to face again at the RPUG conference at VaTech September 15-18 – final decision has not been made. Make lodging accommodations, but recognize that this is preliminary at this time. One benefit of having meeting at RPUG is the strong push that can be made to get more agencies to join the PF. **Action Item:** Preliminary plan is next face to face meeting will be at RPUG – de Leon Izeppi, VaTech will pursue meeting date (preliminary discussion indicated possibly Thursday) and room for PF.

Summary of Action Items: LTPP experiment in June, RPUG experiment in September, 4 RNS to be further developed/refined into projects.