TPF 5(063)
“Improving the Quality of Pavement Profile Measurement”

RPUG UPDATE

November 3, 2015
Overview TPF 5(063)

- Study initiated in 2003
- [http://www.pooledfund.org/Details/Study/280](http://www.pooledfund.org/Details/Study/280)
- FHWA is lead agency with 22 participating State Highway Agencies (SHA’s) $1.8M Study: Partners include:
  - FHWA Office of Asset Management, Pavement and Construction (HIAP)
  - FHWA Long Term Pavement Performance (LTPP)
  - FHWA Federal Lands
## Participating State Agencies (22)

- Ohio
- Louisiana
- Kentucky
- California
- Colorado
- Florida
- Georgia
- Kansas
- Mississippi
- New Jersey
- Nevada
- New York
- North Dakota
- South Dakota
- Illinois
- North Carolina
- Maryland
- Oklahoma
- Connecticut
- Texas
- Wisconsin
- Pennsylvania
Participating State Agencies
TPF 5(063) Priorities

1. Build Reference Profile Device - Ongoing
2. Critical Requirements - Completed
3. ProVAL Software - Ongoing
4. Certification/Validation Sites - Ongoing
5. Evaluating Upper Limits of Single Accelerometer – Phase I & II complete
6. Emerging Technology that Enhances Profile Measurement - Ongoing
7. Support for RPUG - Ongoing
Inertial Profilers?? Yes/No?
Proposed SHA Quality Assurance Data Collection Vehicle

AASHTO M328???
Outcome – Quality Management

• Need to manage Inertial Profilers
  – AASHTO M328 – Obtaining
  – AASHTO R56 – Certification
  – AASHTO R57 – Operation

• Need to manage profiles – NOT just IRI
  – Allow low pass filters of 250 mm to 1 m
  – Have vendors provide actual profiles (if outsourced)

• Need to manage specifications
  – Modify if warranted after implementation
Progress on TPF 5(063) Priorities

1. Build a Reference Profile Device (ongoing): Two parts –
   i. Benchmark Testing – UMTRI - Completed
   ii. Reference Devices – New round of evaluations September 2015 at MnROAD – Participants were:
      i. Shima - Japan
      ii. ICC - Florida
      iii. SSI - California
      iv. ARRB - Australia

2. Critical Requirements (completed): UMTRI; final report on pooled fund study website – “Critical Profile Accuracy Requirements”
3. FHWA ProVAL Software: The Transtec Group, Inc. – www.roadprofile.com
   • ProVAL 3.5 released Sept. 2014
     – Includes GPS & mapping capabilities
   • Version 3.6 due in six months
   • Multiple workshops – 4 of 6 remain
     – Scheduling underway for FY16
     – Next round??
ProVAL 3.5 software & workshops

Smoothness Assurance: Short Continuous Histogram

Total % Out of Spec (No Grinding) 3.24
Total % Out of Spec (After Grinding) 0.62

<table>
<thead>
<tr>
<th>Max JRI (m/s)</th>
<th>Min JRI (m/s)</th>
<th>No Grinding (%)</th>
<th>After Grinding (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120.00</td>
<td>110.00</td>
<td>1.4</td>
<td>0.0</td>
</tr>
<tr>
<td>120.00</td>
<td>110.00</td>
<td>0.4</td>
<td>0.0</td>
</tr>
<tr>
<td>110.00</td>
<td>100.00</td>
<td>0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>100.00</td>
<td>90.00</td>
<td>1.0</td>
<td>0.4</td>
</tr>
<tr>
<td>90.00</td>
<td>80.00</td>
<td>1.9</td>
<td>0.6</td>
</tr>
<tr>
<td>80.00</td>
<td>70.00</td>
<td>2.5</td>
<td>0.6</td>
</tr>
<tr>
<td>70.00</td>
<td>60.00</td>
<td>3.9</td>
<td>1.7</td>
</tr>
<tr>
<td>60.00</td>
<td>50.00</td>
<td>5.6</td>
<td>2.9</td>
</tr>
<tr>
<td>50.00</td>
<td>40.00</td>
<td>11.7</td>
<td>6.0</td>
</tr>
<tr>
<td>40.00</td>
<td>30.00</td>
<td>31.4</td>
<td>10.1</td>
</tr>
<tr>
<td>30.00</td>
<td>20.00</td>
<td>34.3</td>
<td>26.8</td>
</tr>
<tr>
<td>20.00</td>
<td>10.00</td>
<td>5.2</td>
<td>43.9</td>
</tr>
<tr>
<td>10.00</td>
<td>0.00</td>
<td>0.0</td>
<td>6.8</td>
</tr>
</tbody>
</table>
ProVAL Version 3.5 includes mapping
TPF 5(063) Priorities continued

4. Certification/Validation Site
   i. Report completed by FHWA
   ii. Trial for National Certification at MnROAD – October 2015 – Participants:
      i. Ames Engineering, Inc. – Iowa
      ii. ARAN – Fugro: Texas/Canada
      iii. ARRB – Australia
      iv. ICC - Florida
      v. Mandli – Wisconsin
      vi. Pathway - Oklahoma
      vii. SSI – California
      viii. Pavemetrics - Canada
TPF 5(063) Priorities continued

5. Evaluating Upper Limits of Single Accelerometer
   i. Phase I: Starodub, Inc. – complete
   ii. Phase II: Completed Dec. 2011

6. Emerging technology that enhances pavement profile measurement
   i. Urban IRI measurement – FHWA WFL
   ii. Urban and low speed profile indices (NCHRP 10-93)
   iii. Distance Measurement Instruments (DMI)
   iv. Non-inertial ride measurement

7. Support for RPUG
FHWA Toolkit – Ride Quality

• Smoothness
  – ProVAL software (www.roadprofile.com)
  – ASTM E2560-14: Standard Specification for Data Format for Pavement Profile
  – NHI 131100 “Pavement Smoothness”
  – AASHTO Ride Quality Standards Implementation Contract
    • M328 Equipment Specification
    • R54 Accepting Ride Quality using an inertial profiler
    • R56 Certification of Inertial Profilers
    • R57 Operation of Inertial Profilers
Questions?

Robert Orthmeyer, Resource Center
Robert.Orthmeyer@dot.gov
(708) 283-3533