Pavement Performance Measures: Reporting Versus Decision Making

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this presentation will address:

- Performance management concept
- Performance measures used for decision making
- Performance measures used for reporting
- Example gap analysis
- Insights and remaining questions

https://www.tpmtools.org/
Performance Management Concept

- Measures used for planning investments
- Measures used for reporting investment benefits

https://www.fhwa.dot.gov/tpm/resources/training.cfm
Management Performance Measures

- **Network-Level Decisions**
  - Overall/combined condition indices
    - e.g. Pavement Quality Index (PQI), Pavement Condition Index (PCI), etc.
  - Used for planning and budget allocation

- **Project-Level Decisions**
  - Individual performance measures
    - e.g. rut depth, transverse cracking, faulting, fatigue, etc.
  - Used for selecting specific treatments
Reports → Communication → Funds

• Tie asset management analysis results to funding
  – Data-driven, performance-based, defensible
  – Feedback & evaluation of asset management processes

• Transparency, e.g. dashboards
• Accountability, e.g. HPMS Reporting
Example: Virginia DOT Dashboard

http://dashboard.virginiadot.org/
# Federal HPMS Reporting Measures

<table>
<thead>
<tr>
<th>Rating</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRI (inches/mile)</td>
<td>&lt;95</td>
<td>95-170</td>
<td>&gt;170</td>
</tr>
<tr>
<td>PSR* (0.0-5.0 value)</td>
<td>≥4.0</td>
<td>2.0-4.0</td>
<td>≤2.0</td>
</tr>
<tr>
<td>Cracking Percent (%)</td>
<td>&lt;5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CRCP: 5-10</td>
<td>&gt;10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jointed: 5-15</td>
<td>&gt;15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Asphalt: 5-20</td>
<td>&gt;20</td>
</tr>
<tr>
<td>Rutting (inches)</td>
<td>&lt;0.20</td>
<td>0.20-0.40</td>
<td>&gt;0.40</td>
</tr>
<tr>
<td>Faulting (inches)</td>
<td>&lt;0.10</td>
<td>0.10-0.15</td>
<td>&gt;0.15</td>
</tr>
</tbody>
</table>

*PSR may be used only on routes with posted speed limit < 40mph.*
LTPP InfoPave

Find Sections

General
- Age (Since Original Construction)
- Experiment Type
- Study
- Monitoring Status
- Section
- Treatment Type
  - Location (1)
- Maintenance and Rehabilitation
- Roadway Functional Class

Structure
- Surface Type (1)
- Base Type
- Subgrade Type

Climate
- Climatic Region
- Freezing Index (Annual)
- Precipitation (Annual)
- Temperature (Annual)

Traffic
- Avg. Annual Daily Traffic (AADT)
- Avg. Annual Daily Truck Traffic (AADTT)

Data Attributes
- Basic
- Additional
- All

AC Pavement Cracking Indices (172 Sections)
- Survey Date
- 2016 HPMS AC Cracking Percentage (%)
- MEPDG AC Cracking Percentage (%)
- MEPDG AC Cracking Length (ft/mi)
- 2014 HPMS AC Cracking Percentage (%)
- 2014 HPMS AC Cracking Length (ft/mi)
- NPRM AC Cracking Percentage (%)

AC Distress Survey Ratings (172 Sections)
- Survey Date
- Record Status
- Surveyor 1 Initials
- Surveyor 2 Initials
- Photo Video Code

Manual Distress Data Collected by LTPP Accredited raters.
Reporting vs Network Level Measures

- Example: HPMS2016 versus ASTM PCI
- Data: LTPP flexible sections in Texas (173)

HPMS2016 Percent Cracking Vs ASTM D6433 PCI

R² = 0.2286

HPMS2016 Rutting Vs ASTM D6433 PCI

R² = 0.4536
Reporting vs Project Level Measures

- Example: Cracking Percent versus LTPP Cracking
- Data: LTPP flexible sections in Texas

![Graph 1: HPMS2016 Percent_Cracking Vs LTPP Alligator Cracking](image1)

\[ R^2 = 0.3531 \]

![Graph 2: HPMS2016 Percent_Cracking Vs LTPP WP Longitudinal Cracking](image2)

\[ R^2 = 0.2103 \]
Example: Cracking Percent versus LTPP Cracking

Data: LTPP flexible sections in Texas

- HPMS2016 Percent_Cracking Vs LTPP
  - Gator + 0.75*WP_LongCrack
    - $R^2 = 0.7157$

- HPMS2016 Percent_Cracking Vs LTPP
  - Gator + 1.0*WP_LongCrack
    - $R^2 = 0.6545$
Insights and Remaining Questions

- Federal HPMS Reporting Measures
  - CANNOT replace existing network-level measures
  - MIGHT be used for treatment decision making

- Agency investment decisions might not be reflected in the reported performance measures

- Should the existing agency measures change? Probably not!

- Should the federal reporting measures change? Probably won’t!

- Can there be any correlation?
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