I. Call to Order and Opening Remarks

A. Welcome to inaugural TS 5d annual meeting – John Donahue, TS 5D chair welcomed everyone to the inaugural meeting of the technical subcommittee. He noted the TS is the result of merging the Subcommittee on Materials and the Joint Technical Committee on Pavements. He reviewed TS 5d responsibilities regarding the guidelines and research needs statements.

B. Brief overview of agenda items – John briefly reviewed the agenda.

II. Roll Call – Membership List (Attendees highlighted)

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Designation</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Donahue</td>
<td>Missouri DOT</td>
<td>Member</td>
<td>Chair</td>
</tr>
<tr>
<td>LaDonna Rowden (Charles Weinrank)</td>
<td>Illinois DOT</td>
<td>Member</td>
<td>Vice-Chair</td>
</tr>
<tr>
<td>Taylor Janney</td>
<td>Alabama DOT</td>
<td>Liaison</td>
<td>Non-Voting</td>
</tr>
<tr>
<td>Kathryn Malusky</td>
<td>AASHTO</td>
<td>Liaison</td>
<td>Non-Voting</td>
</tr>
<tr>
<td>Ryan Fragapane</td>
<td>AASHTO</td>
<td>Liaison</td>
<td>Non-Voting</td>
</tr>
<tr>
<td>Vicki Schofield</td>
<td>AASHTO</td>
<td>Liaison</td>
<td>Non-Voting</td>
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<tr>
<td>Georgene Geary</td>
<td>GGfGA Engineering</td>
<td>Liaison</td>
<td>Non-Voting</td>
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<tr>
<td>Lyndi Blackburn</td>
<td>Alabama DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Ali Zerah</td>
<td>Arizona DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Dulce Rufino</td>
<td>California DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Jay Goldbaum</td>
<td>Colorado DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Robin Davis</td>
<td>Delaware DOT</td>
<td>Member</td>
<td>Voting</td>
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<tr>
<td>Rhonda Taylor</td>
<td>Florida DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Ian Rish</td>
<td>Georgia DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Chris Brakke</td>
<td>Iowa DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Rick Barezinsky</td>
<td>Kansas DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Paul Looney</td>
<td>Kentucky Transactions Cabinet</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Jeff Lambert</td>
<td>Louisiana DOT&amp;D</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Rick Bradbury</td>
<td>Maine DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Sejal Barot</td>
<td>Maryland DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
<tr>
<td>Edmund Naras</td>
<td>Massachusetts DOT</td>
<td>Member</td>
<td>Voting</td>
</tr>
</tbody>
</table>
III. Approval of Technical Subcommittee Minutes – Since this is the first meeting of TS5d, there are no minutes to approve.

IV. Old Business – Since this is the first meeting of TS5d, there is no old business.

V. New Business

A. Kelly Smith, Applied Pavement Technology, announced the Pavement ME Design User Group meeting is scheduled for November 7-8, 2018 in Nashville, TN.

Travis Walbeck, WV DOT, announced the 2018 Southeastern States Pavement Conference in Charleston, WV from October 22-25.

B. Explanation of TS 5d document oversight responsibilities
      This publication is static right now and since many states are moving to M-E design, there is no interest to update it.
       As a later agenda item, Harold von Quintus, ARA, discussed the proposed changes and addenda, derived from enhancements and corrections to the software.
       Georgene Geary recently completed a 20-07 research project to develop recommendations for improving the Guide. She reported on this item in more detail under a later agenda item.
This is the first of its kind. Since it is a large document, John suggested it be divided by chapters with multiple individuals serving as reviewers. The process for reviewing it and the other documents is discussed in the next two agenda items.

C. Steward assignments for AASHTO documents – Tentatively, the steward oversight roles in other technical subcommittees will be applied to the review of the TS 5d pavement guide documents. John will solicit members to volunteer as stewards later in the year.

D. Task Forces – In the absence of designated stewards the 5d TS may set up task forces to review and make recommended changes in the pavement guide documents. Curt Turgeon noted that other TSs use ETGs. In lieu of a formal ETG, TS 5d may foster a close working relationship with the AASHTOWare Pavement ME Design Product Task Force, which functions like a surrogate ETG.

E. MOP revisions ballot issues presentation - Harold von Quintus (ARA). (Attachment A)

Harold provided a redlined version of the Manual of Practice (MOP), which reflects new features and enhancements added to the Pavement ME Design software since 2015 when the MOP was last revised. Anomalies and comments have also been submitted since 2015. He explained each of the addenda, enhancements, errata and comments related to the software. He also reviewed the technical audit results of the Pavement ME Design source code commissioned by the Pavement ME Task Force in 2016. Four identified issues related to the MOP.

F. FHWA – Cheryl Richter provided a report on FHWA’s efforts to support the Pavement ME Design.

G. Review findings of ‘Guide for Local Calibration of the MEPDG”, Georgene Geary (GGfGA). (Attachment B)

Funded through an NCHRP 20-07 research project contract, Georgene presented her findings from a user review of the AASHTO ‘Guide for the Local Calibration of the Mechanistic-Empirical Pavement Design Guide’. A copy of her final report is available on the TRB web site.

She reported on the general survey results of the review, which included the status of DOTs performing local calibrations of the Pavement ME Design, mainstream design use of the software, minimum information needed to do a local calibration. She then gave a brief overview of recommendations for reorganizing and revising the Guide.

H. Asphalt Research Roadmap pavement design RNSs, Richard Willis (NCAT). (Attachment C)
Richard noted that the “Asphalt Research Roadmap” has not been updated since 2007. NAPA recently formed task groups to address research needs for various aspects of asphalt pavement design, materials and construction. He detailed the two top research needs statements generated by the asphalt pavement design task group.

I. NCHRP Issues

Amir Hanna reviewed the NCHRP research projects related to pavement design that are currently in progress.

VI. Adjourn

Alabama moved to adjourn and Maryland seconded. The meeting adjourned at 11:50 a.m.
ATTACHMENT A

Committee on Materials & Pavements-COMP
2018 Annual Meeting

8 August 2018

MEPDG Manual of Practice

Red-Lined Version of the MEPDG Manual of Practice

2. Enhancements of the software; FY 2015 to current version.
3. Errors and comments submitted just prior to publication of the MEPDG MOP 2\textsuperscript{nd} Edition, 2015.

Red-Lined Version of the MEPDG Manual of Practice

Memorandum

Technical Audit of Code to Review to Identify Engineering Errors or Discrepancies, Fixed Price Activity

Submitted to:

Ms. Vicki Scofield (Program Manager)
Dr. Judith Corley-Lay (Chair, AASHTOWare Pavement ME Design Task Force)

March 11, 2016
First Revision: April 30, 2016
Second Revision: June 5, 2016
Red-Lined Version of the MEPDG Manual of Practice

Technical audit executed in FY 2016.

1. Identify anomalies in the source code and/or Manual of Practice and NCHRP 1-37A documentation.
2. 16 anomalies identified.
3. Only 4 related to MOP.
   1. Indirect tensile strength.
   2. JPCP and AC damage comparison based on k-value correction.
   4. Transverse cracking calibration coefficient.

Red-Lined Version of the MEPDG Manual of Practice

Enhancements of the software; FY 2015 to current version.

1. Addendum prepared for all enhancements in support of the MOP.
2. Addendum posted on the Pavement ME Design website for users to review and use.
Red-Lined Version of the MEPDG Manual of Practice

ENHANCEMENTS TO THE MECHANISTIC-EMPIRICAL PAVEMENT DESIGN GUIDE:

Some are Simple and Straight Forward!

ADDENDUM NUMBER: FY2015.1
ADDENDUM TITLE: ADDITIONAL DEFAULT NORMALIZED AXLE LOAD SPECTRA INCLUDED IN THE MEPDG SOFTWARE
Addendum Date: July 12, 2015

Addendum #FY2015.1 overviews the four new normalized axle load spectra (NALS) that were added to the Pavement ME Design software. These four new default axle load distributions were developed from work completed under the Long Term Pavement Performance (LTPP) program. The purpose of this addendum is to provide an overview of these new NALS and to provide additional guidance to the 2008 Manual of Practice for selecting a NALS for use in pavement design using the Pavement ME Design software.

Red-Lined Version of the MEPDG Manual of Practice

ENHANCEMENTS TO THE MECHANISTIC-EMPIRICAL PAVEMENT DESIGN GUIDE:

Others are Extensive and Affect Many Sections!

ADDENDUM NUMBER: FY2015.4
ADDENDUM TITLE: REFLECTION CRACKING ENHANCEMENT TO THE MEPDG
Addendum Date: August 28, 2015

Reflection cracks were predicted using an empirical regression equation in earlier versions of the Pavement ME Design software. The regression equation was only applicable to transverse cracks and/or joints. As part of a recent enhancement to the software in fiscal year (FY) 2015, the regression equation was replaced with a mechanistic-empirical (ME) based procedure to predict reflection cracks. The procedure developed under NCHRP 1-41 and documented in NCHRP Report 659 was added to the software. This addendum provides a brief overview of the methodology and inputs to the ME-based procedure.
Red-Lined Version of the MEPDG Manual of Practice

Enhancements of the software; FY 2015 to current version.
1. AC layer dependent plastic deformation model coefficients.
2. Four default normalized axle load spectra added.
3. Rigid pavement calibration coefficients updated for CTE.

Red-Lined Version of the MEPDG Manual of Practice

Enhancements of the software; FY 2015 to current version.
4. Integration of reflection cracking model from NCHRP 1-51.
5. SJPCP bonded overlay of flexible pavements.
6. Updated model/calibration coefficients for flexible and semi-rigid pavements.
Red-Lined Version of the MEPDG Manual of Practice

Enhancements of the software; FY 2015 to current version.

7. Added new climate datasets/weather data:
   ▪ North American Regional Reanalysis (NARR) for rigid pavements.
   ▪ MERRA for flexible pavements.
8. Resetting selected distress/performance measures for preventive maintenance treatments.
9. Input level 1, indirect tensile strength as a function of temperature.

Red-Lined Version of the MEPDG Manual of Practice

Enhancements of the software; FY 2015 to current version.

10. Map–ME
    ▪ Determination of input site condition factors from geospatial database.
11. Backcalculation of elastic layer moduli from deflection basin measurements
    ▪ Determination of in place condition of existing pavement layers for rehabilitation design.
Red-Lined Version of the MEPDG Manual of Practice

Errors and comments submitted just prior to publication of the MEPDG MOP 2nd Edition, 2015.

1. 200+ comments/revisions submitted in 2015.

### Review of AASHTO Manual of Practice

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section/Page</th>
<th>Comment</th>
<th>Reviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>All</td>
<td>DARWin ME should be replaced with &quot;ME Design&quot; when referring to the software throughout the MOP.</td>
<td>All</td>
</tr>
</tbody>
</table>

### Red-Lined Version of the MEPDG Manual of Practice

Errors and comments submitted just prior to publication of the MEPDG MOP 2nd Edition, 2015.

3 3.5/25 Semi-Rigid Pavements: The sentence that was rewritten will be read by some users as: "encouraged to use semi-rigid pavements." That is the wrong message. The sentence should be rewritten or left as included in the 2008 MOP version. Users should NOT use the semi-rigid pavement transfer functions until they have been calibrated. Montana and Mississippi clearly showed the predicted distresses have significant bias and users will under-design pavement structures. We do not want that. Harold Von Quintus
### Red-Lined Version of the MEPDG Manual of Practice

Errors and comments submitted just prior to publication of the MEPDG MOP 2\textsuperscript{nd} Edition, 2015.

<table>
<thead>
<tr>
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<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4.1/27</td>
<td><em>Construction Month &amp; Traffic Open Month.</em> Add this sentence at end of paragraph: <em>Construction and traffic opening month both begin on first day of month.</em></td>
<td>Mike Darter</td>
</tr>
<tr>
<td>5</td>
<td>5.5.3/41</td>
<td>Printed error in equation (5-7) for standard error for the alligator cracking (see Appendix A with corrections)</td>
<td>Alex Gotlif</td>
</tr>
</tbody>
</table>

### Red-Lined Version of the MEPDG Manual of Practice

Errors and comments submitted just prior to publication of the MEPDG MOP 2\textsuperscript{nd} Edition, 2015.

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<th>Page</th>
<th>Date</th>
<th>Comment</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5.6.4/63</td>
<td>The spalling model that contributes to IRI should be added to the MOP. Currently is not mentioned anywhere.</td>
<td>Mallela</td>
</tr>
<tr>
<td>5</td>
<td>5.6.5/64</td>
<td>CRCP IRI model error has to be added factor (see Appendix A with corrections)</td>
<td>Alex Gotlif</td>
</tr>
</tbody>
</table>
# Red-Lined Version of the MEPDG Manual of Practice

Errors and comments submitted just prior to publication of the MEPDG MOP 2\textsuperscript{nd} Edition, 2015.

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<thead>
<tr>
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<th>Line No.</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>5</td>
<td>5.2/33</td>
<td>A paragraph was deleted from this section. In my opinion it should stay in, but be rewritten and make reference to NCHRP 9-30A in terms on how testing can be used to reduce the standard error of the rut depth transfer function. This relates to input level 1 versus input level 3 – repeated load plastic deformation testing and not dynamic modulus testing. An incremental cost-benefit analysis was done to demonstrate the cost effectiveness of input level 1 testing. The same is true for bending beam flexural fatigue testing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Page</th>
<th>Line No.</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Table 10-5/118</td>
<td>The CTE values need to be updated to reflect the corrections made to the TP-60 measurements.</td>
</tr>
<tr>
<td>11</td>
<td>11.2.2/136</td>
<td>Recommendations for contact friction need to be updated to reflect values developed under 20-07. Erodibility - typo</td>
</tr>
</tbody>
</table>
Red-Lined Version of the MEPDG Manual of Practice

Illustration showing examples of the red-lined version of the MOP.

Added Information

E-Newsletter for Pavement ME Design.
- Published 3 to 4 times per year.
- Distributed by AASHTOWare.
Added Information

Training workshop on Principles of ME Design.
➢ Developed in FY 2016.
➢ Available to all agencies on the Pavement ME Design website.

Pavement ME Task Force Members

1. John Donahue, P.E.; Missouri DOT, Chairperson
2. Vicki Schofield, AASHTO Project Manager
3. Marta Juhasz, P.E.; Alberta Transportation, Vice-Chair
4. Clark Morrison, P.E., North Carolina DOT
5. Robert Shugart, P.E.; Alabama DOT
6. Karen Strauss, P.E.; Oregon DOT
7. David Holmgren, P.E.; Utah DOT
8. Patrick Bierl, P.E.; Ohio DOT
9. Felix Doucet; TAC Liaison
10. Tom Yu, P.E.; FHWA Liaison
11. Shane Marshall, P.E.; Utah DOT, SCOJD Liaison
12. Travis Tackett, Florida DOT; T&AA Liaison
QUESTION AND ANSWER SESSION

Comments & suggestions;
Send an email to
pavementmedesign@ara.com.

NCHRP 20-07/ Task 422
GGfGA Engineering, LLC
Georgene Geary, P.E., Principal Engineer

Report to COMP TS 5d
August 8, 2018

Final Report- on the TRB website

CONTENTS
1. Background and Introduction (includes COMP Survey results)
2. Current Contents of the Local Calibration Guide
3. Proposed Specific Revisions to the Local Calibration Guide
   References (including listing of local calibration reports)
Appendices
   A. Global Calibration Factors
   B. Detailed Survey Results
   C. Example for New Guide
### Appendix A

#### Global Calibration Factors

**Table A1 — HMA/AC Rating**

<table>
<thead>
<tr>
<th>Transfer Function Coefficient</th>
<th>Global Value (MOP 2008)</th>
<th>Global Value (MOP 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>k1r</td>
<td>-3.35412</td>
<td>-3.35412</td>
</tr>
<tr>
<td>k2r</td>
<td>0.4791</td>
<td>0.4791**</td>
</tr>
<tr>
<td>k3r</td>
<td>1.5606</td>
<td>1.5606**</td>
</tr>
<tr>
<td>i1r</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>i2r</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>i3r</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

*Current Software has ability to have different values for 3 different layers and it notes a Std Dev of 0.24*POW(RUT,0.8062) + 0.001

**MOP 2015 notes in the Prelace (Page v1) that these values have changed to what is in the current software, but they are not changed in the body of the document (pg 39).**

**Table A6 — PCI Mid-Slab (Transverse) Cracking**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>C1</td>
<td>2.0</td>
<td>2.0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>C2</td>
<td>1.22</td>
<td>1.22</td>
<td>1.22</td>
<td>1.22</td>
<td>1.22</td>
</tr>
<tr>
<td>C4</td>
<td>Not defined(1)</td>
<td>1.00</td>
<td>0.6</td>
<td>0.6</td>
<td>0.52</td>
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<tr>
<td>C5</td>
<td>Not defined (2)</td>
<td>-1.98</td>
<td>-2.05</td>
<td>-2.03</td>
<td>-2.17</td>
</tr>
</tbody>
</table>

(1)*0.5080*POW(CRACK 2) + 0.5083
(2)POW(5.316*CRACK 0.290) + 3.33*POW(RACK 0.345) + 2.7825

*Task 288 values shown are as defined in the Task 327 report. NSC was defined as the Task 288 values in a paper (Mn et al., 2016). Current software uses the Task 327 values.

### Survey Results

**AASHTO Pavement ME Design Local Calibration**

COMP Survey – Thanks Again for completing the survey!!
General survey results

- 46 States and Ontario Responded

- Only 2 respondents noted that they were not familiar with the Local Calibration Guide
  - 1 respondent offered that they used the Design Guide (MOP) Also

- 29 States and Ontario noted they had performed a local calibration
  - 3 Others in process

- 24 noted they had performed a local calibration after 2010

Have you ever performed (or contracted) a local calibration of AASHTO Pavement ME?
Do you currently use AASHTO Pavement ME either for your State/Provinces pavement designs or for comparison designs (parallel effort)?

Panel Member Comment:

"Learned way more from this (Task 3) than from the original LC Guide."

My Comment:

"Learned way more from trying to do a mini- Local Calibration than from the original LC Guide, but I still don't know how to explain this:

LC Guide page 6-5: "Since the square of $s_e$ is a variance, the confidence interval on the variance can be used to show the relationship between sample size and the relative error variance $(s_e/s_v)$"
Main Points driving the needed Revisions

• PMED Software has changed and continues to change
  • Local calibration efforts have identified needs for new research for improvements to the models, this will likely continue

• The equations used in the software are essential to local calibration
• Specific methods to calibrate are not clear in the existing LC Guide
• Practitioners need to be part of the process, but the LC Guide is not written for them now

Minimum info needed to perform Local Cal

<table>
<thead>
<tr>
<th>In LC Guide</th>
<th>Partially in LC Guide</th>
<th>Not in LC Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Calibration Process Flow Chart</td>
<td>Calibration factors &amp; transfer equations</td>
<td>Basic description of what all the calibration factors affect/relate to</td>
</tr>
<tr>
<td>(current LC Guide Chapter 6)</td>
<td>Statistical methods and examples</td>
<td>National SEE terms to evaluate local calibration (does not now include the current ones)</td>
</tr>
<tr>
<td>Distress definitions used in PMED</td>
<td>Examples of how best to use PMS data that is not exactly as defined</td>
<td></td>
</tr>
</tbody>
</table>
“Guide for the Local Calibration of PMED”

- Introduction
  1. Select Input: Levels
  2. Develop Experiment Plan and Sampling Template
  3. Estimate Sample Size
  4. Select Roadway Segments
  5. Extract and Evaluate Distress and Project Data
  6. Conduct Field and Forensic Investigations
  7. Assess Local Bias
  8. Eliminate Local Bias
  9. Assess the Standard Error (SEE, or Se)
  10. Reduce the Standard Error
  11. Interpretation of Results

Appendix A - Lessons Learned
Appendix B - Statistical References

‘Set up’ portion

Calibration portion

Potential Lessons Learned from Local Calibration Reports (Proposed Appendix A)

- Different values beyond Standard error used to evaluate calibration
  LOE R²- (line of equality) and MAPE (mean absolute percentage error)
- Separate calibrations based on different subgrade modulus
- Using an FEM analysis to determine a new C1 cracking factor for 20 ft jointed pavement
- Method developed to compute rutting using transverse profile
- Residual plots to compare errors to different inputs
Revised Guide should:

- Use the Basic step-by-step procedure as the main format
- Use consistent nomenclature and non-statistical language
- ADD:
  - Method required for calibration of distress: software runs required or regression possible?
  - Equations to be calibrated
  - Calibration coefficients and how, why to adjust
  - Detailed examples of computing calibration factors
- Have examples for each Step in the process

---

**Section 8.2: Local Calibration**

**IPCP Transverse Cracking Model**

Adjusting calibration coefficients for IPCP Transverse cracking

\[
\log(b) = C_1 - \frac{M_R}{a} - C_2 a
\]

**CRC = 100 \times \frac{C_4}{C_4 + C_5}**

*PHED Cracking* analysis: A document from the PHED analysis system provides *Total BU* and *Total TD* fatigue damage by month. These values are based on the fatigue damage predictions which then make the transverse cracking transfer factors and then the *C1* and *C2* coefficients are used to determine the total transverse cracking damage. The fatigue damage values themselves are not based on *C4* and *C5*, so the values in the PHED run computed using the global calibration factors from Section 7 can be used directly here. Based on the TCrack equation noted in Section 7 for the TCrack prediction:

\[
\text{TCrack predicted} = \frac{100}{1 + 100 \times \frac{C_4}{C_4 + C_5}}
\]

And the regression:

\[
\text{Ypred} = \text{TCrack predicted at month} i \text{ based on the formula above, and}
\]

\[
Ytrue = \text{measured} \text{ transverse cracks at month} i \text{ and}
\]

\[
X = \text{Total BU} \times \text{Total TD}
\]

A typical graph of measured vs cracking vs fatigue damage is shown below:

---

**Example in REPORT**

Examples to include equations, calibration coefficients, graphs, and even examples of how to compute (i.e. Excel Solver)
Main Points from Report

- LC Guide needs to be reorganized and updated – *outline provided*

- LC Guide needs more detail to perform a consistent local calibration and to compare local calibration efforts in the future

- Changes, updates or identified errors in equations need to be communicated clearly and timely to users outside the ‘printed’ Guide
  - Add Calibration site to AASHTOWare PMED website which will always contain the latest values and equations?

- Need Project to Perform Updates- NCHRP 20-123 Or Full NCHRP Project?

Thanks!

Any Questions??
Asphalt Research "Roadmap"

AASHTO COMP
August 8, 2018

Development Plan & Direction

- Introduction
- Goal
- Objectives
- Scope
- Organization & Responsibilities
  - Oversight Committee
  - Topic Area Teams
  - Communications
  - Support
- Timeline

National Catalog of
Asphalt Research & Workforce
Development Needs
An Asphalt Research Roadmap
Development Plan and Direction 2017

NAPA Committee for Asphalt Research & Technology
November 5, 2017
NCAR Organization RNS Development Cycle

1. Mix Design (Randy West)
   - Objective: To develop a mix design procedure that supersedes current mix design specifications integrating the latest sustainable technologies while assuring good performance with buy-in from industry and agency stakeholders.

2. Pavement Design (Dave Newcomb)
   - Objective: To advance implementable design philosophies which improve the life-cycle cost analysis results of asphalt mixtures.

3. Production & Construction (Dale Decker)
   - Objective: To aid industry in improving the quality and consistency of asphalt mixtures at the plant and being placed in the field.

4. Preservation, Maintenance, and Rehabilitation (Adam Hand)
   - Objective: To improve the construction and performance of asphalt mixture applications which are used as preservation or minor rehabilitation treatments.

5. Life Cycle Cost Analysis (Nam Tran)
   - Objective: To develop education and methodologies which will allow roadway owners to perform appropriate life cycle cost analyses using data-based assumptions while understanding how uncertainty can impact LCCA results.

6. Sustainability (Richard Willis)
   - Objective: To advance practical, sustainable practices which can be easily adopted and understood by contractors and agencies to reduce the environmental footprint of the asphalt industry without negatively impacting pavement performance or LCCA.

7. Technology (Bill Buttlar)
   - Objective: To advance and education industry and agencies on technological advances which will improve pavement and mixture quality, life cycle cost analysis and life cycle assessments.

8. Workforce Development and Training (Peta Capon)
   - Objective: To develop tools for analyzing current and future workforce development and training needs; develop proactive ideas and strategies for workforce development and Training; and identify new workforce development and training delivery techniques that are well received by multiple generations.
RNS by Topic Area

<table>
<thead>
<tr>
<th>Topic Area</th>
<th>RNS Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixture Design</td>
<td>MD-1. Developing a Web-based Guide for Selection of Appropriate Asphalt</td>
</tr>
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<td>Mixture Types</td>
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<td></td>
<td>MD-2. Laboratory Aging Protocols for Assessing the Cracking Resistance of</td>
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<td>Asphalt Mixtures</td>
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<tr>
<td>Pavement Design</td>
<td>PD-1. New Materials &amp; Technology Deployment in Asphalt Pavement Structural</td>
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<tr>
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<td>Design</td>
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<td>PD-2. Redesigning Pavement Rehabilitation Design</td>
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<td>Production &amp; Construction</td>
<td>PC-1. Innovative Approaches to Aggregate Handling at the Asphalt Plant</td>
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<tr>
<td>Preservation,</td>
<td>PC-2. Systematic Control of RAP Materials</td>
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<tr>
<td>Maintenance, &amp; Rehabilitation</td>
<td>PM-1. Guidelines for Thinlay Applications and Use with Design and</td>
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<td></td>
<td>Construction Best Practices</td>
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<tr>
<td>Life Cycle Cost Analysis</td>
<td>LCCA-1. Comparing LCCA Results to Historical Costs</td>
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<tr>
<td></td>
<td>LCCA-2. Determination of Actual Performance Periods</td>
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<td></td>
<td>LCCA-3. Life Cycle Corridor Analysis</td>
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<tr>
<td>Sustainability</td>
<td>S-1. Development of Industry and Regional Averages for Environmental</td>
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<td>Impacts of Asphalt Mixtures</td>
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<tr>
<td>Technology</td>
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<tr>
<td>Workforce Development &amp;</td>
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</tbody>
</table>

Oversight Committee

- Champion the overall road map development
- Aid in identifying sustainable funding to create living document
- Review RNS developed by each Topic Area Teams
  - Ensure teams are efficiently working toward objective of NCARWDN without redundancy
- OS Meeting June 28th
# Pavement Design

<table>
<thead>
<tr>
<th>RNS Title</th>
<th>Priority</th>
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<tbody>
<tr>
<td>Deployment of New Technologies in Structural Pavement Design</td>
<td>1</td>
</tr>
<tr>
<td>Redesign Rehabilitation Design</td>
<td>2</td>
</tr>
<tr>
<td>Pavement Design for Roads with Automated/Connected Vehicles</td>
<td>3</td>
</tr>
<tr>
<td>Constructability Review Guidance for Local Governments</td>
<td>4</td>
</tr>
<tr>
<td>Development of an Integrated Structural/Material Design Method</td>
<td>5</td>
</tr>
<tr>
<td>and QA/QC Specifications for Asphalt Pavements</td>
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<tr>
<td>Improving Mechanistic-Empirical (ME) pavement performance prediction models for fatigue cracking</td>
<td>6</td>
</tr>
<tr>
<td>Efficient Perpetual Pavement Design (French EME)</td>
<td>7</td>
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<tr>
<td>Next Generation Pavement Design</td>
<td>8</td>
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<tr>
<td>Development of a catalogue of calibration coefficients (or predictive equations) for ME pavement design</td>
<td>9</td>
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<tr>
<td>Enhance accuracy of ME performance models by including models for maintenance treatments</td>
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<tr>
<td>Identification of pavement sections with high quality and complete dataset for ME model calibration needs</td>
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## RNS Objectives

<table>
<thead>
<tr>
<th>Topic Area</th>
<th>RNS Topic</th>
<th>Objective(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement Design</td>
<td>PD-1. New Materials &amp; Technology Deployment in Asphalt Pavement Structural Design</td>
<td>The primary objective of this research is to identify and develop methods for rapidly calibrating transfer functions for ME design. The objectives would be achieved through five broad tasks: 1. Comprehensive literature review of existing calibration methodologies. 2. Identify or develop potential transfer function rapid calibration procedure(s). 3. Establish proof-of-concept using new procedure(s) in laboratory. 4. Validate new transfer function calibration procedure(s) with field data. 5. Develop guidance document for new calibration procedure(s).</td>
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<td></td>
<td>PD-2. Redesigning Pavement Rehabilitation Design</td>
<td>The objectives of this research are: 1. Review current state of mobile/nondestructive pavement evaluation technologies (GPR, FWD, LIDAR, digital image processing/analysis methods, etc.) to provide information for the design of rehabilitation projects. 2. Provide guidance on calibrating and deploying equipment and collecting and organizing data. 3. Provide guidance on data analysis and interpretation to identify non-uniform conditions and the type and level of investigations needed for further definition of the conditions. 4. Provide guidance on integration of information for project-level decisions regarding repairs, structural design, construction costs, and performance.</td>
</tr>
</tbody>
</table>
Coming Soon

- Website development
- New RNSs to replace ideas taken to research

For more information contact:
- Richard Willis, Director of Pavement Engineering and Innovation
  rwillis@asphaltpavement.org