NEAUPG Meeting
October 20, 2016

Asphalt Mix Committee Meeting
Performance Based Specification

Introduction

The Northeast Asphalt User Producer Group’s (NEAUPG) Asphalt Mix Committee is looking closely at Performance Based Specifications (PBS). The Committee would like to provide state agencies in the Northeast with information on laboratory tests which will closely predict asphalt pavement performance in the field over a typical design life. We expect that this process will require multiple tests based on differing criteria and performance characteristics. The eventual objective is to allow states the opportunity to maintain specifications that meet their needs while allowing producers/contractors the means to deviate from those specifications if the require tests are run and criteria are met on mixes in the laboratory.

We are reaching out to research centers, State Materials Engineers, and stakeholders to get in site into possible laboratory tests that may be used to predict in place performance and if there is any consensus on which tests are most effective. This includes the actual test, test protocols, and possible standards.

We appreciate your participation in this Survey. All results will be kept confidential and consolidated into one final report. You will be sent a full copy of Survey results when finalized.

Thank you for your time in this matter.

Respectfully yours,

NEAUPG Mix Committee
Co-chairs:  Edmund Naras – Pavement Management Engineer, MassDOT
            Bruce Barkevich – Vice President, New York Construction Materials Assoc.
Performance Based Specification

Survey

Organization:________________________________________

Individual Filling Out Survey:_________________________ Title:_____________________

Address:__________________________________________________________________________

Email:_________________________________________ Phone:__________________________

Pavement Distresses

Please list the 5 most important pavement distresses that you feel affect pavement performance over its life:

1) ____________________________________________
2) ____________________________________________
3) ____________________________________________
4) ____________________________________________
5) ____________________________________________

Others:___________________________________________________________________________
Survey

Laboratory Tests

Of the 5 distresses above, do you feel there is a laboratory test which can predict the performance of the pavement relative to that distress. If so, what standard for the test would you use.

<table>
<thead>
<tr>
<th>Distress</th>
<th>Test</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td></td>
<td></td>
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<tr>
<td>2)</td>
<td></td>
<td></td>
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<td>3)</td>
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<td>4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other: ___________________________________________________________________
Performance Based Specification

Survey

Test Criteria

For each of the tests listed above, there are possible test criteria that will insure good performance. Please list what criteria you may want the test samples to meet and if this will change based on field conditions: (traffic, dynamics, loading, environmental, etc.)

<table>
<thead>
<tr>
<th>Test</th>
<th>Test Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td></td>
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<tr>
<td>3)</td>
<td></td>
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<tr>
<td>4)</td>
<td></td>
</tr>
<tr>
<td>5)</td>
<td></td>
</tr>
</tbody>
</table>

Other: __________________________________________
Performance Based Specification

Survey

Conclusion:

Thank you for taking the time to fill in the above information. This is the first of many steps toward a regional acceptance of Performance Based Specifications. We appreciate your continued participation in advance. Please use the space below to list any other information, concerns, or thoughts about predicting pavement performance in the lab: cost implications, possible loopholes in this concept, additional considerations (warranties, field testing, etc.). Anything that may help state agencies determine if this concept can work for their organization.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
Tom Bennert – Rutgers
Rand West – NCAT
Buzz Powell – NCAT
Walaa Mogawer – UMass
Jo Daniel – UNH
Craig Clark – Alfred State
Dave Newcomb – Texas A&M
Leslie McCarthy- Villanova
Mansour Solaimanian – Penn State
Brian Prowell – Advance Asphalt Technologies
John Haddock – Purdue
Kevin Hall – U Arkansas
Louay Mohammad – LSU
Richard Kim – North Carolina State
Elie Hajj – Univ of Nevada – Reno\nDennis Coakley, Jr. – Advanced Testing

And NEAUPG State Materials Engineers
Survey

Organization: Atlantic Testing Labs

Title: Operations Manager

Address: 251 Upper North Rd, Highland, NY 12528

Email: dcoylter@atlantic-testing.com
Phone: ____________________________

Pavement Distresses

Please list the 5 most important pavement distresses that you feel affect pavement performance over its life:

1) Fatigue Cracking
2) Rutting
3) Raveling
4) Transverse Cracking
5) Checking

Others: ____________________________
### Laboratory Tests

Of the 5 distresses above, do you feel there is a laboratory test which can predict the performance of the pavement relative to that distress? If so, what standard for the test would you use.

<table>
<thead>
<tr>
<th>Distress</th>
<th>Test</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue Crackling</td>
<td>Flexural Bending</td>
<td>AASHTO 7321</td>
</tr>
<tr>
<td>Cutting</td>
<td>Hawkey wheel/AMPT</td>
<td>AASHTO 7321</td>
</tr>
<tr>
<td>Raveling</td>
<td>AMPT</td>
<td>ASTM 7196</td>
</tr>
<tr>
<td>Transverse Crackling</td>
<td>Flexural Bending</td>
<td>AASHTO 7321</td>
</tr>
<tr>
<td>Checking</td>
<td>AMPT</td>
<td>ASTM 7196</td>
</tr>
</tbody>
</table>

Other: ____________________________

### Test Criteria

For each of the tests listed above, there are possible test criteria that will insure good performance. Please list what criteria you may want the test samples to meet and if this will change based on field conditions (traffic, dynamic, loading, environmental, etc.)

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>Traffic count, Fine as they, AMPT</td>
</tr>
<tr>
<td>Cutting</td>
<td>Traffic count, Fine as they, AMPT</td>
</tr>
<tr>
<td>Raveling</td>
<td>Traffic count, Binder grading</td>
</tr>
<tr>
<td>Transverse Crackling</td>
<td>Traffic count, Flex bending, Load, Environment</td>
</tr>
<tr>
<td>Checking</td>
<td>AMPT, Binder grading</td>
</tr>
</tbody>
</table>

Other: ____________________________
Performance Specs - Surrogate Tests

• Equipment we already have

• Specimens we typically make and are good at making

• Correlation to an expected test method

• Timely Test Results
Tests Conducted

<table>
<thead>
<tr>
<th>Test</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cantabro</td>
<td>AASHTO TP 108-14</td>
</tr>
<tr>
<td>SCB</td>
<td>LTRC method</td>
</tr>
<tr>
<td>IDT</td>
<td>NCAT</td>
</tr>
<tr>
<td>Overlay Tester</td>
<td>Tex-248-F modified by NCAT</td>
</tr>
</tbody>
</table>

- Test specimens were made from SGC samples compacted to $N_{design}$ (65 gyrations)
- Using $N_{design}$ specimens provides the quickest and simplest path to implementation for any of these durability “performance” tests.
- Sealed buckets of mix were reheated, weighed out, then brought back to the compaction temperature before SGC compaction.
Cantabro Test

- Primarily used for OGFC mixes
- One compacted specimen placed in LA Abrasion drum at a time
- No Steel Balls
- 300 drum revolutions
- Calculate mass loss
- Studies by Doyle and Howard
Modified Overlay Test

- Method modified by NCAT
  - Displacement = 0.381 mm
  - Cycle = 1 Hz
  - Failure = peak of normalized load x cycle
- Conducted in AMPT @ 25°C
- Triplicates
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SAT</td>
<td>ALUMINUM BASE PLATE</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Base Upright Post</td>
<td>ACRYLIC UPRIGHT GUIDE POST</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>ASPHALT SAMPLE</td>
<td>ASPHALT SAMPLE</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>TOP PUSH CAP</td>
<td>RADIUS TOP PUSH CAP</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Base Press Block Pin</td>
<td>BASE PUSH BLOCK PINS</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Push Block</td>
<td>PUSH BLOCK</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>STOP</td>
<td>ALUMINUM SAMPLE STOP</td>
<td>1</td>
</tr>
</tbody>
</table>
Semi-Circular Bend Test (LTRC)

- 50 mm thick specimens
- Ram rate = 0.5 mm/min.
- Notch depths of 38.1, 31.8, 25.4 mm
- Triplicates

\[
y = -0.0388x + 1.9336 \\
R^2 = 0.70
\]
IDT Fracture Energy

- 50 mm thick specimens
- Ram rate = 50 mm/min.
- Temp. = 25°C
- Area under load vs. displ. at peak load
- Triplicates

\[ y = 0.0006x^4 - 0.0218x^3 + 0.29x^2 - 1.6819x^1 + 3.1811x^0 + 3.3704x^{-0.0994} \]

\[ R^2 = 0.99883 \]
## Preliminary Assessment

<table>
<thead>
<tr>
<th>Test</th>
<th>Time(^1)</th>
<th>COV</th>
<th>Sens.</th>
<th>Corr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cantabro</td>
<td>40 min.</td>
<td>19%</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Mod. OT</td>
<td>2 days</td>
<td>32%</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>SCB-LTRC</td>
<td>1.5 days(^2)</td>
<td>27%(^3)</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>IDT Nflex factor</td>
<td>4 hours</td>
<td>11%</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

1 once Ndes specimens are cooled  
2 requires five SGC specimens  
3 COV of Work (area under load-def. curve)