AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

AASHTO

COMMITTEE ON MATERIALS & PAVEMENTS

2017 Annual Meeting – Cincinnati, OH
Thursday August 9, 2018
10:15-11:30 AM

TECHNICAL Subcommittee 5c
Quality Assurance and Environmental

I. Call to Order and Opening Remarks

A. Brief summary of activities *(to ensure all attendees up to speed)*

II. Roll Call

III. Approval of Technical Section Minutes (attachment #1)

IV. Old Business

A. SOM Ballot Items
   1. Outstanding items from Mid-Year Meeting?
B. TS Ballots (attachment #2)
   1. Determining Constant Mass 14 Affirmative, 3 Negative and 8 No vote.
      a. Comments regarding display of equations
      b. Illinois – not needed, plus comments
      c. Florida – Formula did not display correctly (hieroglyphics)
      d. Connecticut – Multiple changes throughout Standard. (#3)
   2. Dielectric Profiling System 17 Affirmative, 8 no vote
      a. Upon discussion, will require motion to move to full Ballot
   3. File Format of Intelligent Construction Data 17 Affirmative, 8 no vote
      a. Upon discussion, will require motion to move to full Ballot
   4. Changes to R25 as recommended by the WAQTC 18 Affirmative, 7 No vote (attachment #4)
      a. Upon discussion, will require motion to move to full Ballot

C. Task Force Reports – No active task forces.

V. New Business

A. Research Proposals
   1. Performance Specifications Implementation Guide (attachment #5)
   2. Manual for Incorporating NDT in Quality Assurance (attachment #6)
B. AASHTO Re:source/CCRL - Observations from Assessments?
C. NCHRP Issues
D. Correspondence, calls, meetings
   i. PRESENTATION: Dr. George Chang, Transtec ” Building Information Modeling (BIM) for Pavements (attachment #7)
E. Presentation by Industry/Academia
F. Proposed New Standards
G. Proposed New Task Forces
   i. FHWA ETG on Pavement Sustainability Update
H. Standards Requiring Reconfirmation
   i. Handled directly by AASHTO staff
I. SOM Ballot Items (including any ASTM changes/equivalencies)

VI. Open Discussion

VII. Adjourn

AASHTO
THE VOICE OF TRANSPORTATION
SUBCOMMITTEE ON MATERIALS

COMMITTEE ON MATERIALS AND PAVEMENTS

2017 Mid-Year Webinar Meeting

November 16, 2017

TECHNICAL SECTION 5c
Quality and Environment

Curt Turgeon (MN) Chair and Sejal Barot (MD) Vice Chair

I. **Call to Order and Opening Remarks -**Curt Turgeon called the meeting to order at 1 pm

II. Roll Call – see attendance list attached

III. Approval of Technical Section Meeting Minutes Curt asked for any negatives to the prior TS minutes, hearing none the minutes were approved by the TS.

IV. Old Business

COMP / TS Ballot – the Chair discussed the ballot items:

- R16 was discussed at length at the AM in Phoenix, it has been approved for deletion.
- R25 was revised by Dennis Dvorak based on comments from the Annual Meeting. The Chair described the contents of R25 and noted that the ballot passed but Pennsylvania had a comment that the Chair wanted to discuss with the TS. Several attendees (Maine, Missouri) specifically noted that they felt it would also be valuable to add binder certification to R25. It was decided that asphalt binder certification should be added to R25 (may require a new appendix also) with the goal of putting the changes on a TS ballot this Spring. Chair will lead this effort.
- Chair noted there were no comments or negatives on PP80 and PP81 balloted changes
- Chair noted that R18 was transferred to TS 5c this past year from the Executive Committee. It was felt that the standard was better served under 5c. Changes passed and no comments.
- Chair noted that a standard number will be assigned (by AASHTO Publications) to the new standard on "Accreditation Bodies…" and it will be published as there were no negatives. Chair noted that the only accreditation body that appears to meet this standard currently is AASHTO res:ource.

Ballot Item	COMP		Tech Section	
	Positives	Negatives /No Vote	Positives	Negatives /No Vote
SOM Ballot item to delete R16. Standard contains numerous references to NIOSH and OSHA which may not be up to date, nor do we control if/when future changes may occur. Users should directly reference NIOSH or OSHA	44	0/7	22	0/5
SOM Ballot Item to revise R25. This Standard contains a lot of non-mandatory information. Negative TS ballots have been addressed by clearing up misinterpretation by adding notes. Pages 5-21. Comment – replace 'asphalt concrete" with asphalt mixture. DONE Comment – add a couple of references DONE Comment (Ramirez, PA) – a section on certification of binder techs, Chair agrees but seemed to be beyond an editorial change. To be considered.	44	0/7	22	0/5
SOM Ballot Item to revise PP80. Updated and editorial TS Comments	44	0/7	22	0/5

addressed. Pages 22-51.				
SOM Ballot Item to revise PP81. Updated and editorial TS Comments addressed. Pages 52-108.	44	0/7	22	0/5
Concurrent Ballot Item to revise R18. Changes suggested by WAQTC*. Page 3, 109-146.	44	0/7	22	0/5
Concurrent ballot item to adopt "Accreditation Bodies Operating in the Fields of Construction Materials Testing and Inspection" as a full standard. Once approved the standard moves to 5c.	44	0/7	22	0/5

V. New Business (Tech Section ballot)

The Chair noted that the three proposed new standards were also discussed at the AM.

A) WAQTC noted that many standards refer to constant mass, but it is not defined, so they developed a standard to determine constant mass. B) The File format standard was introduced at the AM by a presentation by George Chang. The format is similar to Proval for IRI. C) The last standard on GPR for rolling density was developed through the SHRP R06 project. The Chair will be sending these new standards, along with the R25 changes, out to TS ballot in the Spring.

A. New Standard from WAQTC, PP-XX Determining Constant Mass

B. New Standard PP -XX File Format of Intelligent Construction Data

C. New Standard PP –XX Ground Penetrating Radar for Asphalt Dielectric Variability Assessment

VI. Open Discussion

A. **FHWA Sustainable Pavements ETG**

- The Chair provided some background on the ETG, noting they have been meeting for about 7 years, and he has been involved just recently. The Chair explained they have been working on Product Category Rules for pavement materials. The PCR lays out how to develop an Environmental Product Declaration – "nutrition" labels for a standard unit of material (i.e. GHG/ ton asphalt mix at plant or CO2/ton). These are in heavy use in LEED certification and the concrete industry has this website where they maintain EPDs: https://www.nrmca.org/sustainability/EPDProgram/#EPDWebinar
- Industries create PCRs (NRMCA, MAPA); companies create EPDs per mix at each plant. The future is coming where Projects will need to consider these EPDs and add impacts of moving materials from plants to jobsite to fully capture the environmental impacts. At the last ETG meeting there was discussion on who becomes the overseer of these PCR and EPD documents for the highway industry, and 'How does AASHTO fit into all this?'.
- Virginia asked about the status/future of potential regulations regarding this process. The Chair noted that currently there is no mandate on the horizon, but he has heard of legislators asking some States what they are doing in this area. It was recognized by all that this could be a highly contentious issue due to the competitive nature of the industry. The Chair noted that both asphalt and concrete industry representatives are represented on the FHWA ETG.
- Florida noted that they recently had the opportunity to be a part of a panel meeting on NCHRP 10-91A on Sustainable Highway Construction Practices and that it is an issue that is growing, and enforcement could potentially be in the future.
- The AASHTO Environment and Sustainability Committee was suggested as an avenue to request some information or direction. It was suggested and agreed that it would be good to have someone share what is going on in the sustainability area to all AASHTO Committees at a high level, since it is not just a pavement or materials issue alone.
- Shannon Eggleston, AASHTO liaison for the Environment and Sustainability Committee will be contacted to be made aware of TS 5c's request and the PCR/EPD oversight question.

VII. Meeting Adjourned at 1:30 pm

Tech Section 5c

November 16, 2017 Mid-Year Meeting
Attendees

Chair, Curt Turgeon (Minnesota)
Proxies for Kurt Williams (Washington State)
Kevin Burns (WA)
Randy Mawdsley (WA)
Brett Trautman (Missouri)
Rick Bradbury (Maine)
Andy Babish (Virginia)
John F. Staton (Michigan)
Denis M. Boisvert (New Hampshire)
Brian J. Johnson (AASHTO re:source)
Clark S. Morrison (North Carolina)
Brian A. Pfeifer (Illinois)
Brian Egan (Tennessee)
Heather Hall (Tennessee)
Mike Doran (Tennessee)
Jason Mellons (Tennessee)
Timothy J. Ruelke (Florida)
J.T. Rabun(Georgia)
F. Steven Heiser (New York)
Greta Smith (AASHTO consultant)
Georgene Geary (AASHTO consultant)
Evan Rothblatt (AASHTO)

AASHTO Electronic Balloting System

Ballot Detail Report

Ballot Detail	
Ballot Name:	TS5c TS Ballot 1 for 2018
Ballot Manager:	Katheryn Malusky
Ballot Start Date:	4/30/2018
Ballot Due Date:	5/30/2018

TS5c TS Ballot 1 for 2018

Item Number:	1
Description:	**Item 1. Determining Constant Mass** WAQTC has developed a standard for determining constant mass. Many standards use differing approaches to constant mass. Having this standard would simplify other standards allow this reference rather than restating the process.
Decisions:	Affirmative: 14 of 25 Negative: 3 of 25 No Vote: 8 of 25

Agency (Individual Name)	Comments	Decision	Responce Attachment
Ontario Ministry Of Transportation (Anne Holt) (anne.holt@ontario.ca)			
AASHTO re:source (Brian Johnson) (bjohnson@aashtoresource.org)			
Diversified Engineering Services, Inc. (Cecil L Jones) (cecil.jones@nc.rr.com)			
American Association of State Highway and Transportation Officials (Evan Rothblatt) (erothblatt@aashto.org)			
GGfGA Engineering, LLC (Georgene M Geary) (ggeary@ggfga.com)			
Federal Highway Administration (Gregory Doyle) (gregory.j.doyle@dot.gov)			

AASHTO re:source (Gregory V Uherek) (guherek@aashtoresource.org)	
American Association of State Highway and Transportation Officials (Greta Smith) (gsmith@aashto.org)	
Connecticut Department of Transportation (James P. Connery) (James.Connery@ct.gov)	
Federal Highway Administration (Dennis Dvorak) (dennis.dvorak@dot.gov)	
D B Consulting and Associates, LLC (Desna Bergold) (desna@dbconllc.com)	
National Center for Asphalt Technology at Auburn University (Donald E. Watson) (watsode@auburn.edu)	
International Coding Technologies, Inc. (Jeffrey M Pollock) (jpollock@idencia.com)	
Federal Highway Administration (Jeffrey Withee) (jeff.withee@dot.gov)	
California Department of Transportation (Keith D Hoffman) (keith.hoffman@dot.ca.gov)	Yes. This recommended procedure is identical to the procedure and calculations outlined in our CT 226, "Method of Test for Moisture Content of Soils and Aggregates by Oven Drying." AASHTO has different test methods to determine moisture content of soils and aggregates where this procedure is called out on how to perform calculations
AASHTO re:source (Maria Knake) (mknake@aashtoresource.org)	I agree that a standard like this is a good idea, and I think WAQTC for their work on putting this together and bringing it to COMP! A

	couple of minor comments from AASHTO re:source: Is Section 5.2 required every time? If so perhaps it would be best to put this section before determining if the sample is at constant mass, and then just requiring a check on the pan mass after the same is removed to make sure it is within the stated tolerance. I question whether it is is necessary determine the constant mass of the pan every time it is used. Section 5.1.11: Depending upon the sample size, covering the container with a lid, foil, or a watch glass may be important so that the sample does not absorb moisture from the air while cooling.
Maine Department of Transportation (Mark D Alley) (mark.alley@maine.gov)	Recommend a YES vote.
Federal Highway Administration (Matthew Corrigan) (matthew.corrigan@dot.gov)	
Federal Highway Administration (Michael M Arasteh) (MICHAEL.ARASTEH@DOT.GOV)	**I have reviewed Item 1, Determining Constant Mass. As a non-voting member, I suggest for consideration as determined by voting members.**
Alaska Department of Transportation and Public Facilities (Richard S. Giessel) (richard.giessel@alaska.gov)	

AASHTO re:source (Robert Lutz) (rlutz@aashtoresource.org)		
AASHTO re:source (Sonya Rose Puterbaugh) (sputerbaugh@aashtoresource.org)		
Ontario Ministry Of Transportation (Stephen Lee) (stephen.lee@ontario.ca)		
AASHTO re:source (Steven Lenker) (slenker@aashtoresource.org)		
Oregon Department of Transportation (Sean P. Parker) (Sean.P.Parker@odot.state.or.us)		
Federal Highway Administration (Tim Aschenbrener) (timothy.aschenbrener@dot.gov)		
Gallivan Consulting Inc. (Victor Lee Gallivan) (lee@gallivanconsultinginc.com)		
Maryland Department of Transportation (Woody Hood) (whood@sha.state.md.us)		
Maryland Department of Transportation (Sejal Barot) (sbarot@sha.state.md.us)	----------	Affirmative

Affirmative. with minor editing comments:

1. The Formula in Section **5.1.8** should read as

   % Change = [(M_P - M_n) / (M_P - M_c)] x 100

2. The Formula in Section **5.2.5** should read as

   % Change = [(M_P - M_n) / M_P] x 100

	---------- ---------- This recommended practice will be a useful resource for test methods that do not specifically address how to determine the constant mass when drying samples or containers for testing. Vote: Affirmative ---------- ----------	
South Carolina Department of Transportation (Temple Short) (shorttk@scdot.org)	When i pulled up the Word doc the formulas did not show up correctly.	Affirmative
Utah Department of Transportation (Scott S Andrus) (scottandrus@utah.gov)		Affirmative
Arkansas Department of Transportation (Michael C Benson) (michael.benson@ardot.gov)		Affirmative
Nebraska Department of Transportation (Mick S Syslo) (mick.syslo@nebraska.gov)		Affirmative
Arizona Department of Transportation (Paul Burch) (pburch@azdot.gov)		Affirmative
Missouri Department of Transportation (Brett Steven Trautman) (Brett.Trautman@modot.mo.gov)	Affirmative vote with editorial comments: - In Section 5.1.8, recommend modifying the variables used in the equation. Variables would be as follows: MMpp to Mp MMnn to Mn MMcc to Mc % CChaaaaaaaa to %Cs - In Section 5.1.11, recommend adding a comma	Affirmative

	after the word "mass" so it reads as: "...determine and record the final dry mass, if required.) - In Section 5.2.5, recommend modifying the variables used in the equation. Variables would be as follows: MMpp to Mp MMnn to Mn % CChaaaaaaaa to %Cc	
Kansas Department of Transportation (Richard A Barezinsky) (rick.barezinsky@ks.gov)	May want to revisit how the equations are displayed as the multiplication by 100 appears in the denominator.	Affirmative
New York State Department of Transportation (Donald Streeter) (donald.streeter@dot.ny.gov)		Affirmative
Hawaii Department of Transportation (Eric Shishido) (eric.shishido@hawaii.gov)		Affirmative
Colorado Department of Transportation (Jay Goldbaum) (jay.goldbaum@state.co.us)		Affirmative
Mississippi Department of Transportation (Jeff Gibbes Curtis) (jcurtis@mdot.ms.gov)		Affirmative
Virginia Department of Transportation (Charles A. Babish) (andy.babish@vdot.virginia.gov)		Affirmative
Minnesota Department of Transportation (Curt Turgeon) (curt.turgeon@state.mn.us)		Affirmative
Illinois Department of Transportation (Brian Pfeifer) (brian.pfeifer@illinois.gov)	If one method could work for all materials there would be merit in this Standard. However, since there are many methods and	Negative

	definitions of Constant Mass for many different materials, which are typically incorporated in the respective standards, this Standard is not needed. We would recommend incorporating the appropriate Constant Mass definition and requirements in the referenced T 255 and T 265 Standards. If the Standard were to move forward, we offer the following recommendations: 5.1.1 What are units and how many significant figures? 5.1.3 What are units and how many significant figures? 5.1.4 How do you determine that the sample "appears moisture free"? 5.1.5 What are units and how many significant figures? 5.1.7 What are units and how many significant figures? 5.1.8 Equation should be as follows: % Change = ((Mp-Mn)/(Mp-Mc))x100 5.2.5 Equation should be as follows: % Change = ((Mp-Mn)/(Mp))x100 Add a "6.1.5 Actual percent change of mass"	
Florida Department of Transportation (Timothy J. Ruelke) (timothy.ruelke@dot.state.fl.us)	Well written. I just had a formatting problem with the formula when I opened it in word: %	Negative

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Connecticut Department of Transportation (Robert G Lauzon) (robert.lauzon@ct.gov)	Needs clarification - suggestions within the attached.	Negative	Download Attachment(s)
Oklahoma Department of Transportation (Scott Seiter) (sseiter@odot.org)		No Vote	
Maine Department of Transportation (Richard L Bradbury) (richard.bradbury@maine.gov)		No Vote	
Ontario Ministry Of Transportation (Becca Lane) (becca.lane@ontario.ca)		No Vote	
New Hampshire Department of Transportation (Denis M. Boisvert) (Denis.Boisvert@dot.nh.gov)		No Vote	
Rhode Island Department of Transportation (Mark E Felag) (mark.felag@dot.ri.gov)		No Vote	
Montana Department of Transportation (Matt Strizich) (mstrizich@mt.gov)		No Vote	
West Virginia Department of Transportation (Paul M Farley) (paul.m.farley@wv.gov)		No Vote	
Alaska Department of Transportation and Public Facilities (Michael San Angelo) (michael.sanangelo@alaska.gov)		No Vote	

Item Number:	**2**
Description:	**Item 2. Dielectric Profiling System**. SHRP RO6C developed this test device. This standard defines the device and ensures proper calibration and usage for testing asphalt pavementâ€™s surface dielectric.

Decisions:	Affirmative: 17 of 25 Negative: 0 of 25 No Vote: 8 of 25

Agency (Individual Name)	Comments	Decision	Responce Attachment
Ontario Ministry Of Transportation (Anne Holt) (anne.holt@ontario.ca) AASHTO re:source (Brian Johnson) (bjohnson@aashtoresource.org) Diversified Engineering Services, Inc. (Cecil L Jones) (cecil.jones@nc.rr.com) American Association of State Highway and Transportation Officials (Evan Rothblatt) (erothblatt@aashto.org) GGfGA Engineering, LLC (Georgene M Geary) (ggeary@ggfga.com) Federal Highway Administration (Gregory Doyle) (gregory.j.doyle@dot.gov) AASHTO re:source (Gregory V Uherek) (guherek@aashtoresource.org) American Association of State Highway and Transportation Officials (Greta Smith) (gsmith@aashto.org) Connecticut Department of Transportation (James P. Connery) (James.Connery@ct.gov)			
Federal Highway Administration (Dennis Dvorak) (dennis.dvorak@dot.gov)	Section 5.3.2-Change "Performance Specifications" to performance requirements or first-time startup procedure since Performance Specifications has a different definition in AASHTO R10. Section 5.3.5-How are unique days defined? Section 6.2-Earlier drafts of this standard included a requirement		

	for the display of the high and low dielectric values. Why was that removed? Section 7.4-Spell out IR since this is it's first use in the standard.
D B Consulting and Associates, LLC (Desna Bergold) (desna@dbconllc.com)	
National Center for Asphalt Technology at Auburn University (Donald E. Watson) (watsode@auburn.edu)	
International Coding Technologies, Inc. (Jeffrey M Pollock) (jpollock@idencia.com)	
Federal Highway Administration (Jeffrey Withee) (jeff.withee@dot.gov)	
California Department of Transportation (Keith D Hoffman) (keith.hoffman@dot.ca.gov)	Caltrans is not implementing this system.
AASHTO re:source (Maria Knake) (mknake@aashtoresource.org)	
Maine Department of Transportation (Mark D Alley) (mark.alley@maine.gov)	Recommend a YES vote.
Federal Highway Administration (Matthew Corrigan) (matthew.corrigan@dot.gov)	
Federal Highway Administration (Michael M Arasteh) (MICHAEL.ARASTEH@DOT.GOV)	**I have reviewed Item 2. Dielectric Profiling System, where test device was developed as part of SHRP RO6C . As a non-voting member, I suggest for consideration as determined by voting members.**
Alaska Department of Transportation and Public Facilities (Richard S. Giessel) (richard.giessel@alaska.gov)	6.1.2.4 a recording interval of 0.5" is excessive. 0.1' (1.2") is more than enough data density. I don't want to look as data

	blocks finer than 0.5' long in the direction of travel as the heat map gets too busy to manage. I currently have the software average 5 each 0.1' readings to give a heat map block 0.5' long by the antenna spacing (typically 2') wide.	
AASHTO re:source (Robert Lutz) (rlutz@aashtoresource.org)		
AASHTO re:source (Sonya Rose Puterbaugh) (sputerbaugh@aashtoresource.org)		
Ontario Ministry Of Transportation (Stephen Lee) (stephen.lee@ontario.ca)		
AASHTO re:source (Steven Lenker) (slenker@aashtoresource.org)		
Oregon Department of Transportation (Sean P. Parker) (Sean.P.Parker@odot.state.or.us)		
Federal Highway Administration (Tim Aschenbrener) (timothy.aschenbrener@dot.gov)		
Gallivan Consulting Inc. (Victor Lee Gallivan) (lee@gallivanconsultinginc.com)		
Maryland Department of Transportation (Woody Hood) (whood@sha.state.md.us)		
Connecticut Department of Transportation (Robert G Lauzon) (robert.lauzon@ct.gov)		Affirmative
Florida Department of Transportation (Timothy J. Ruelke) (timothy.ruelke@dot.state.fl.us)	1. 1. Scope â€“ suggest changing the word "freeway" to "highway" 2. 2. Section 5.2.2 â€“ why specify an upper limit of 50 mph? Up to "freeway speeds" is used in the scope. The survey speed used by many	Affirmative

agencies and organizations is often greater than 50 mph.

3. 3. Air-Coupled GPR â€“ suggest rewording to state that operational frequency should include frequencies between 1 and 3 GHz. This wording would also allow 3D GPR systems with multiple frequencies that are also capable of generating high frequencies.
4. 4. Section 5.3.3 - The definition of Mid-Term Dielectric Stability appears missing.
5. 5. Section 5.3.5 â€“ Recommend that the long-term stability be evaluated in a single day for a maximum of 2 hrs. A number of states use this process with good success for assessing antennaâ€™s performance.
6. 6. Section 6.1.2.4 â€“ Distance-mode â€“ It should be clear that the fixed distance interval is controlled/determined by the DMI and not by the software.
7. 7. 6.2. Data Display â€“ Can the data be also reported as the result of stacking, and/or oversampling

as indicated in Section 6.1.2.4?

8. 8. Figure 2 â€“ Is it necessary to require the software to produce a heat map? As long as the software produces a table with dielectric values and corresponding DMI and GPS locations a heat map and line chart can be produced with 3rd party software if needed.
9. 9. Section 6.3 - Data Analysis â€“ This appears to be more appropriate as a "Reporting Section"
10. 10. Section 7.2.1 - Antenna Amplitude Variation â€“ Suggest rewording "*An antenna must be re-calibrated whenever the metal plate calibration amplitude exceeds 3 standard deviations from its historical mean*".
11. 11. Section 7.4 â€“ Spell out IR first like "Infra-Red (IR) technology".
12. 12. Spell out the GNSS acronym first herein. It is defined in Section 9.1 which is after Section 7.4
13. 13. Section 8 â€“ Suggest the change from "PROFILER ACCURACY" to "ACCURACY".

	Section 9.1 â€“ Typo in "navigation" ("g" is missing). 1.	
Maryland Department of Transportation (Sejal Barot) (sbarot@sha.state.md.us)	Although we currently do not use this test device, the technology and principles are sound. Vote: Affirmative --- --- We did not use this system yet. However we are looking into using the Rolling Density Meter with similar technology. We are affirmative.	Affirmative
South Carolina Department of Transportation (Temple Short) (shorttk@scdot.org)		Affirmative
Utah Department of Transportation (Scott S Andrus) (scottandrus@utah.gov)		Affirmative
Arkansas Department of Transportation (Michael C Benson) (michael.benson@ardot.gov)		Affirmative
Nebraska Department of Transportation (Mick S Syslo) (mick.syslo@nebraska.gov)		Affirmative
Arizona Department of Transportation (Paul Burch) (pburch@azdot.gov)		Affirmative
Missouri Department of Transportation (Brett Steven Trautman) (Brett.Trautman@modot.mo.gov)		Affirmative
Kansas Department of Transportation (Richard A Barezinsky) (rick.barezinsky@ks.gov)		Affirmative
New York State Department of Transportation (Donald Streeter) (donald.streeter@dot.ny.gov)		Affirmative

Hawaii Department of Transportation (Eric Shishido) (eric.shishido@hawaii.gov)		Affirmative
Colorado Department of Transportation (Jay Goldbaum) (jay.goldbaum@state.co.us)		Affirmative
Mississippi Department of Transportation (Jeff Gibbes Curtis) (jcurtis@mdot.ms.gov)		Affirmative
Virginia Department of Transportation (Charles A. Babish) (andy.babish@vdot.virginia.gov)		Affirmative
Minnesota Department of Transportation (Curt Turgeon) (curt.turgeon@state.mn.us)		Affirmative
Illinois Department of Transportation (Brian Pfeifer) (brian.pfeifer@illinois.gov)	Section 1.2: It is stated in the first sentence that DPS continuously measures asphalt compaction quality. It may be more appropriate to state that DPS continuously measures relative asphalt compaction quality. Section 5.3.6: suggest changing the second sentence to: This section is applicable to multi-channel DPS systems only. Section 6.1.1: It may be applicable to add the asphalt concrete mixture design number or designation to the list of meta data. Section 6.1.2.3: More details should be provided for this section regarding: frequency of calibration, tolerances for re-calibration, and the allowable fitting function formulas should be provided in equation form.	Affirmative
Ontario Ministry Of Transportation (Becca Lane) (becca.lane@ontario.ca)		No Vote
New Hampshire Department of Transportation (Denis M. Boisvert) (Denis.Boisvert@dot.nh.gov)		No Vote

Rhode Island Department of Transportation (Mark E Felag) (mark.felag@dot.ri.gov)	No Vote
Montana Department of Transportation (Matt Strizich) (mstrizich@mt.gov)	No Vote
West Virginia Department of Transportation (Paul M Farley) (paul.m.farley@wv.gov)	No Vote
Alaska Department of Transportation and Public Facilities (Michael San Angelo) (michael.sanangelo@alaska.gov)	No Vote
Oklahoma Department of Transportation (Scott Seiter) (sseiter@odot.org)	No Vote
Maine Department of Transportation (Richard L Bradbury) (richard.bradbury@maine.gov)	No Vote

Item Number:	**3**
Description:	**Item 3. File Format of Intelligent Construction Data** Numerous vendors are creating Paver Mounted Thermal Imaging, Intelligent Construction, Dielectric Profiling Systems and other new pavement construction technologies. There is a need to establish a data standard for these technologies so a standard platform (Veta) can use the data. This is analogous to the ASTM standard for pavement profile data used in PROVAL.
Decisions:	Affirmative: 17 of 25 Negative: 0 of 25 No Vote: 8 of 25

Agency (Individual Name)	Comments	Decision	Responce Attachment
Ontario Ministry Of Transportation (Anne Holt) (anne.holt@ontario.ca)			
AASHTO re:source (Brian Johnson) (bjohnson@aashtoresource.org)			
Diversified Engineering Services, Inc. (Cecil L Jones) (cecil.jones@nc.rr.com)			
American Association of State Highway and Transportation Officials			

(Evan Rothblatt) (erothblatt@aashto.org)	
GGfGA Engineering, LLC (Georgene M Geary) (ggeary@ggfga.com)	
Federal Highway Administration (Gregory Doyle) (gregory.j.doyle@dot.gov)	
AASHTO re:source (Gregory V Uherek) (guherek@aashtoresource.org)	
American Association of State Highway and Transportation Officials (Greta Smith) (gsmith@aashto.org)	
Connecticut Department of Transportation (James P. Connery) (James.Connery@ct.gov)	
Federal Highway Administration (Dennis Dvorak) (dennis.dvorak@dot.gov)	
D B Consulting and Associates, LLC (Desna Bergold) (desna@dbconllc.com)	
National Center for Asphalt Technology at Auburn University (Donald E. Watson) (watsode@auburn.edu)	
International Coding Technologies, Inc. (Jeffrey M Pollock) (jpollock@idencia.com)	
Federal Highway Administration (Jeffrey Withee) (jeff.withee@dot.gov)	
California Department of Transportation (Keith D Hoffman) (keith.hoffman@dot.ca.gov)	Caltrans is not implementing this intelligent construction data.
AASHTO re:source (Maria Knake) (mknake@aashtoresource.org)	
Maine Department of Transportation (Mark D Alley) (mark.alley@maine.gov)	Recommend a YES vote.

Federal Highway Administration (Matthew Corrigan) (matthew.corrigan@dot.gov)		
Federal Highway Administration (Michael M Arasteh) (MICHAEL.ARASTEH@DOT.GOV)	I have reviewed Item 3. File Format of Intelligent Construction Data . There is a need to establish a data standard for these technologies so a standard platform (Veta) can use the data. As a non-voting member, I suggest for consideration as determined by voting members.	
Alaska Department of Transportation and Public Facilities (Richard S. Giessel) (richard.giessel@alaska.gov)		
AASHTO re:source (Robert Lutz) (rlutz@aashtoresource.org)		
AASHTO re:source (Sonya Rose Puterbaugh) (sputerbaugh@aashtoresource.org)		
Ontario Ministry Of Transportation (Stephen Lee) (stephen.lee@ontario.ca)		
AASHTO re:source (Steven Lenker) (slenker@aashtoresource.org)		
Oregon Department of Transportation (Sean P. Parker) (Sean.P.Parker@odot.state.or.us)		
Federal Highway Administration (Tim Aschenbrener) (timothy.aschenbrener@dot.gov)		
Gallivan Consulting Inc. (Victor Lee Gallivan) (lee@gallivanconsultinginc.com)		
Maryland Department of Transportation (Woody Hood) (whood@sha.state.md.us)		
Connecticut Department of Transportation (Robert G Lauzon) (robert.lauzon@ct.gov)		Affirmative

Florida Department of Transportation (Timothy J. Ruelke) (timothy.ruelke@dot.state.fl.us)	Affirmative
Maryland Department of Transportation (Sejal Barot) (sbarot@sha.state.md.us)	Affirmative
South Carolina Department of Transportation (Temple Short) (shorttk@scdot.org)	Affirmative
Utah Department of Transportation (Scott S Andrus) (scottandrus@utah.gov)	Affirmative
Arkansas Department of Transportation (Michael C Benson) (michael.benson@ardot.gov)	Affirmative
Nebraska Department of Transportation (Mick S Syslo) (mick.syslo@nebraska.gov)	Affirmative
Arizona Department of Transportation (Paul Burch) (pburch@azdot.gov)	Affirmative
Missouri Department of Transportation (Brett Steven Trautman) (Brett.Trautman@modot.mo.gov)	Affirmative
Kansas Department of Transportation (Richard A Barezinsky) (rick.barezinsky@ks.gov)	Affirmative
New York State Department of Transportation (Donald Streeter) (donald.streeter@dot.ny.gov)	Affirmative
Hawaii Department of Transportation (Eric Shishido) (eric.shishido@hawaii.gov)	Affirmative
Colorado Department of Transportation (Jay Goldbaum) (jay.goldbaum@state.co.us)	Affirmative
Mississippi Department of Transportation (Jeff Gibbes Curtis) (jcurtis@mdot.ms.gov)	Affirmative
Virginia Department of Transportation (Charles A. Babish) (andy.babish@vdot.virginia.gov)	Affirmative

Minnesota Department of Transportation (Curt Turgeon) (curt.turgeon@state.mn.us)	Affirmative
Illinois Department of Transportation (Brian Pfeifer) (brian.pfeifer@illinois.gov)	Affirmative
Ontario Ministry Of Transportation (Becca Lane) (becca.lane@ontario.ca)	No Vote
New Hampshire Department of Transportation (Denis M. Boisvert) (Denis.Boisvert@dot.nh.gov)	No Vote
Rhode Island Department of Transportation (Mark E Felag) (mark.felag@dot.ri.gov)	No Vote
Montana Department of Transportation (Matt Strizich) (mstrizich@mt.gov)	No Vote
West Virginia Department of Transportation (Paul M Farley) (paul.m.farley@wv.gov)	No Vote
Alaska Department of Transportation and Public Facilities (Michael San Angelo) (michael.sanangelo@alaska.gov)	No Vote
Oklahoma Department of Transportation (Scott Seiter) (sseiter@odot.org)	No Vote
Maine Department of Transportation (Richard L Bradbury) (richard.bradbury@maine.gov)	No Vote

Date: 6/4/2018

Standard Recommended Practice for

Determining Constant Mass

AASHTO Designation: PP XX-17

American Association of State Highway and Transportation Officials
444 North Capitol Street N.W., Suite 249
Washington, D.C. 20001

Standard Recommended Practice for

Determination of Constant Mass

AASHTO Designation: PP XX-17

AASHTO

1. SCOPE

1.1. This ~~practice~~ document contains general criteria and guidelines for ~~a standard of~~ determining constant mass ~~when drying~~of material samples or sample containers used during test methods. ~~for testing~~. This practice is intended for use with test methods that ~~do not contain~~lack ~~all the specific~~ requirements for determining constant mass.

1.2. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- T 255, Total Evaporable Moisture Content of Aggregate by Drying
- T 265, Laboratory Determination of Moisture Content of Soils

3. TERMINOLOGY

3.1. *Constant mass*—the state at which a mass does not change more than a given percent, after additional drying for a defined time interval, at a required temperature.

4. SIGNIFICANCE AND USE

4.1.1. A consistent method of defining and determining constant mass of a sample or containers is required to ~~help~~ reduce variations in test results. This practice does not supercede any requirements within a test method that may define the allowable temperature, time interval, and ~~allowable percent change in~~definition of constant mass. When a test method does not address any or all of these, ~~consider~~ the following should be considered:

4.1.2. **Related test methods**—Test methods for comparable material type, where a procedure for constant mass or its components is included. ~~are defined, should be considered~~.

4.1.3. ~~*Temperature*~~**Heat Source**~~—Test methods differ in specifying temperatures. When a~~ heat sources that are ~~is~~ not thermostatically controlled, ~~effort~~ should be used in a way that ~~made to~~ distributes the heat evenly throughout the sample. This can be accomplished by stirring; ~~changing~~ managing the distance or output from the heat source, such as a heat lamp or open flame; ~~reducing the heat output;~~ or in the case of a microwave, reducing the ~~time~~ duration of each interval. Regardless of the heat source ~~and method~~or equipment, the same procedure ~~should~~ must be used for each cycle ~~in~~ of the constant mass ~~determination~~ procedure.

~~4.1.4.~~ **Time interval**~~—All samples are dried for an initial time and subsequent drying intervals.~~ Initial and subsequent drying times may be dependent on the size of the sample, sample container, or heat source~~, or any combination thereof~~. Appendix X1 should be reviewed prior to adjusting

any of these parameters.

4.1.5.4.1.4. ~~*Allowable percent change of mass*~~**Test Repeatability**—Test measurement repeatability may influence the definition of constant mass. ~~and influence on results should be addressed.~~

Note 1–T 255 and T 265 ~~allow~~ define constant mass as ~~a maximum~~ a percent change in mass of less than 0.1 percent.

5. PROCEDURE

5.1. *Determine constant mass of a sample*:

5.1.1. Determine and record container mass to +/- (something?) .

5.1.2. Place sample in the container.

5.1.3. Determine and record initial sample and container mass if evaporable moisture content is desired.

5.1.4. Dry the sample until it appears moisture free.

Note 2—Do not exceed either the temperature or time limits specified in the test method(s) ~~to be performed on the sample as it may alter the results~~.

5.1.5. Remove the sample and container from the heat source, immediately determine and record the mass.

Note 3—Use a cooling rack, oven mitt or other separation device between the hot container and balance to protect the ~~balance and electronics~~weighing equipment.

5.1.6. Return the sample and container to the heat source for the additional time interval.

5.1.7. Remove the sample and container and immediately determine and record the mass.

5.1.8. Calculate the percent change by subtracting the new mass from the previous mass and divide by the previous mass minus the mass of the container. Multiply this by 100.

$$\%\,CChaaaaaaaa = \frac{\left|MM_{p} - MM_{nn}\right|}{MM_{pp} - MM_{cc}} \times 100$$

Where:

M_p = previous mass determination
M_n = new mass determination
M_c= container mass

5.1.9. The sample is at constant mass if the percent change is less than or equal to the ~~allowed variation~~ specified value.

5.1.10. Repeat the drying cycles, step 5.1.5 through 5.1.9, ~~if the percent change exceeds the allowable variation~~ until the percent change is less than or equal to the ~~allowable variation~~specified value.

5.1.11. Cool the sample and container and determine and record the final dry mass if required.

5.2. *Determine constant mass of a container*:

5.2.1. Bring the clean container to the temperature of the heat source.

5.2.2. Remove the container from the heat source, immediately determine and record the mass.

Note 3— Use a cooling rack, oven mitt or other separation device between the hot container and balance to protect the balance and electronics.

5.2.3. Return the container to the heat source for the additional time interval.

5.2.4. Remove the container and determine and immediately record the mass.

5.2.5. Calculate the percent change by subtracting the new mass from the previous mass and divide by the previous mass. Multiply this by 100.

$$\%\ CChaaaaaaaa = \frac{MM_{pp} - MM_{nn}}{MM_{pp}} \times 100$$

Where:

M_p = previous mass determination
M_n = new mass determination

5.2.6. The container is at constant mass if the percent change is less than or equal to the allowed variation.

5.2.7. Repeat the drying cycles, step 5.2.2 through 5.2.6, if the percent change exceeds the allowable variation until the percent change is less than or equal to the allowable variation.

6. REPORT

6.1. *The report shall include the following*:

6.1.1. Drying temperature

6.1.2. Initial drying time

6.1.3. Time interval

6.1.4. Allowable percent change of mass

APPENDIX

(Nonmandatory Information)

X1. DEVELOPING AN ADDITIONAL DRYING TIME INTERVAL

X1.1. Initial drying time and additional intervals can be stated in a standard test. The variables that may influence the drying time would be the relative humidity of the lab, the air flow past the sample, the sample agitation, drying multiple samples at the same time, the particle and sample size, and the temperature the sample reaches during each cycle, etc.

X1.2. It has been found that using a 230 ±9°F oven and a reasonable amount of samples and airflow, an additional drying period of 30 to 60 min., depending upon the material, is adequate.

X1.3. When using heat sources that are not thermostatically controlled, such as hot plates, stove tops, heat lamps or open flame torches, an additional drying period of 10 min. may be sufficient.

X1.4. When using a microwave, consider the wattage and the amount of material you are drying. At 900 watts, an additional time of 2 min. is adequate. When using a flammable container, adjust the time so the container doesn't char.

AASHTO Electronic Balloting System

Ballot Detail Report

Ballot Detail

Ballot Name:	TS5c TS Ballot 2 for 2018
Ballot Manager:	Katheryn Malusky
Ballot Start Date:	4/30/2018
Ballot Due Date:	5/30/2018

TS5c TS Ballot 2 for 2018

Item Number:	**1**
Description:	Changes to R 25 as recommended by the WAQTC.
Decisions:	Affirmative: 18 of 25 Negative: 0 of 25 No Vote: 7 of 25

Agency (Individual Name)	Comments	Decision	Responce Attachment
Ontario Ministry Of Transportation (Anne Holt) (anne.holt@ontario.ca)			
AASHTO re:source (Brian Johnson) (bjohnson@aashtoresource.org)			
Diversified Engineering Services, Inc. (Cecil L Jones) (cecil.jones@nc.rr.com)			
American Association of State Highway and Transportation Officials (Evan Rothblatt) (erothblatt@aashto.org)			
GGfGA Engineering, LLC (Georgene M Geary) (ggeary@ggfga.com)			
Federal Highway Administration (Gregory Doyle) (gregory.j.doyle@dot.gov)			
AASHTO re:source (Gregory V Uherek) (guherek@aashtoresource.org)			
American Association of State Highway and Transportation Officials (Greta Smith) (gsmith@aashto.org)			
Connecticut Department of Transportation (James P. Connery)			

(James.Connery@ct.gov)	
Federal Highway Administration (Dennis Dvorak) (dennis.dvorak@dot.gov)	The proposed changes to R25 look fine with the exception of the addition of T44 (Solubility of Bituminous Materials). Recommend not including this test in Section 2.1. This test uses trichloroethylene to dissolve a sample of asphalt cement to determine the amount of insoluble material in the sample. During a 2016 survey, no state, NETTCP or WAQTC includes this test in their technician certification program.
D B Consulting and Associates, LLC (Desna Bergold) (desna@dbconllc.com)	
National Center for Asphalt Technology at Auburn University (Donald E. Watson) (watsode@auburn.edu)	
International Coding Technologies, Inc. (Jeffrey M Pollock) (jpollock@idencia.com)	
Federal Highway Administration (Jeffrey Withee) (jeff.withee@dot.gov)	
California Department of Transportation (Keith D Hoffman) (keith.hoffman@dot.ca.gov)	YES. AASHTO R 25-18 is a standard practice to initiate and implement a technician training and certification programs like our JTCP. This document has a good framework about how to set up program organizational structure and management and policies. This should help any State DOT to initiate a program like JTCP. In fact we have adopted some of the procedures outlined in the document while implementing out JTCP like having an educational institution (CSULB) lead the training. There are some minor changes from the previous version and I donâ€™t see any language that is objectionable. Main change is the replacement of the word

	"qualification" with "certification" and that should be ok. The task group functions language has been refined in the proposed version. Since our JTCP is already been launched and ongoing, this document will have little impact on us.
AASHTO re:source (Maria P. Knake) (mknake@aashtoresource.org)	
Maine Department of Transportation (Mark D Alley) (mark.alley@maine.gov)	Recommend a YES vote.
Federal Highway Administration (Matthew Corrigan) (matthew.corrigan@dot.gov)	
Federal Highway Administration (Michael M Arasteh) (MICHAEL.ARASTEH@DOT.GOV)	**I have reviewed Item 1, Changes to R 25 as recommended by the WAQTC. As the non-voting member, I suggest for consideration as determined by voting members**
Alaska Department of Transportation and Public Facilities (Richard S. Giessel) (richard.giessel@alaska.gov)	Appendix X1. Section X1.1.3 Compaction / Density AASHTO needs a standard method for determination of maximum density for crushed aggregates and gravels like ASTM D4253. T 180 degrades crushed aggregate by the kneading action of the drop hammer and produces an artificially high maximum density while altering the gradation to a finer more rounded state. This is highly undesirable.
AASHTO re:source (Robert Lutz) (rlutz@aashtoresource.org)	
AASHTO re:source (Sonya Rose Puterbaugh) (sputerbaugh@aashtoresource.org)	
Ontario Ministry Of Transportation (Stephen Lee) (stephen.lee@ontario.ca)	
AASHTO re:source (Steven Lenker) (slenker@aashtoresource.org)	
Oregon Department of Transportation (Sean P. Parker) (Sean.P.Parker@odot.state.or.us)	
Federal Highway Administration (Tim Aschenbrener) (timothy.aschenbrener@dot.gov)	
Gallivan Consulting Inc. (Victor Lee Gallivan) (lee@gallivanconsultinginc.com)	
Maryland Department of Transportation (Woody Hood)	Vote Affirmative

(whood@sha.state.md.us)		
Florida Department of Transportation (Timothy J. Ruelke) (timothy.ruelke@dot.state.fl.us)		Affirmative
Maryland Department of Transportation (Sejal Barot) (sbarot@sha.state.md.us)		Affirmative
South Carolina Department of Transportation (Temple Short) (shorttk@scdot.org)		Affirmative
Utah Department of Transportation (Scott S Andrus) (scottandrus@utah.gov)		Affirmative
Maine Department of Transportation (Rick L Bradbury) (Richard.Bradbury@maine.gov)	2.1: Recommend keeping reference to T 164, Quantitative Extraction. NETTCP includes in their HMA course, and many agencies use (specifically for RAP testing). Recommend deleting last two references: "Implementation Manual for QA" and "QA Guide Specification". Both have been discontinued by AASHTO. 5.3: Correct name for NETTCP is "NorthEast Transportation Training and Certification Program"	Affirmative
Connecticut Department of Transportation (Robert G Lauzon) (robert.lauzon@ct.gov)		Affirmative
Arkansas Department of Transportation (Michael C Benson) (michael.benson@ardot.gov)		Affirmative
Nebraska Department of Transportation (Mick S Syslo) (mick.syslo@nebraska.gov)		Affirmative
Arizona Department of Transportation (Paul Burch) (pburch@azdot.gov)		Affirmative
Missouri Department of Transportation (Brett Steven Trautman) (Brett.Trautman@modot.mo.gov)		Affirmative
Kansas Department of Transportation (Richard A Barezinsky) (rick.barezinsky@ks.gov)		Affirmative
New York State Department of Transportation (Donald Streeter) (donald.streeter@dot.ny.gov)	My only comments are that; 1) AASHTO T 121 (unit weight and air content) of freshly mixed concrete is cited in the document but not in the reference section.	Affirmative

	2) AASHTO R 60 (sampling freshly mixed concrete) is cited in the document but not contained in the references.	
Hawaii Department of Transportation (Eric Shishido) (eric.shishido@hawaii.gov)		Affirmative
Colorado Department of Transportation (Jay Goldbaum) (jay.goldbaum@state.co.us)		Affirmative
Mississippi Department of Transportation (Jeff Gibbes Curtis) (jcurtis@mdot.ms.gov)		Affirmative
Virginia Department of Transportation (Charles A. Babish) (andy.babish@vdot.virginia.gov)		Affirmative
Minnesota Department of Transportation (Curt Turgeon) (curt.turgeon@state.mn.us)		Affirmative
Illinois Department of Transportation (Brian Pfeifer) (brian.pfeifer@illinois.gov)		Affirmative
Ontario Ministry Of Transportation (Becca Lane) (Becca.Lane@ontario.ca)		No Vote
New Hampshire Department of Transportation (Denis M. Boisvert) (Denis.Boisvert@dot.nh.gov)		No Vote
Rhode Island Department of Transportation (Mark E Felag) (mark.felag@dot.ri.gov)		No Vote
Montana Department of Transportation (Matt Strizich) (mstrizich@mt.gov)		No Vote
West Virginia Department of Transportation (Paul M Farley) (paul.m.farley@wv.gov)		No Vote
Alaska Department of Transportation and Public Facilities (Michael San Angelo) (michael.sanangelo@alaska.gov)		No Vote
Oklahoma Department of Transportation (Scott Seiter) (sseiter@odot.org)		No Vote

AASHTO STANDING COMMITTEE ON RESEARCH
AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

NCHRP Problem Statement Outline

I. PROBLEM NUMBER

To be assigned by NCHRP staff.

II. PROBLEM TITLE

Performance Specifications Implementation Guide

III. RESEARCH PROBLEM STATEMENT

Many public transportation agencies are in the process of implementing some type of performance specifications for asphalt mix and concrete. Reasons for doing so include a desire to improve long-term durability, encourage contractor innovation, better align design requirements with construction, and to have rational pay adjustments tied to predicted project life.

Ongoing initiatives such as Balanced Mix Designs for asphalt mixes and Performance Engineered Concrete Mixes lend themselves to a performance specification approach by introducing higher level test methods that are intended to be more directly related to material performance than current methods. Introduction of these test methods and mix design criteria will have a major impact on existing quality assurance programs. Agencies will need to make informed decisions regarding applicability of new tests to process control, quality control, and/or acceptance. Lot and sublot sizes may need to be adjusted to account for test time and complexity. Quantity of material obtained for testing may need to be increased. Technician training and certification programs will need to be addressed, as will laboratory qualification/accreditation programs. Independent Assurance procedures will need to be developed, and the impact on dispute resolution programs must be assessed. Precision and bias of the newer test methods will need to be determined, along with appropriate specification limits for various quality characteristics. New approaches to pay adjustments will need to be developed.

Agencies will benefit from a performance specification implementation guide for asphalt and concrete. The transition from current QA practices which often rely on properties such as aggregate gradation or mixture volumetrics to performance-related criteria will be challenging, and will introduce new risks for DOTs and contractors. Understanding the impact on performance-related testing on the core elements of quality assurance will help this transition to occur in a controlled fashion, and could help minimize risk to both parties during the implementation process.

IV. LITERATURE SEARCH SUMMARY

There have been several recent studies related to this subject. NCHRP Synthesis "Performance Specifications for Asphalt Mixtures" documents the current state of practice with regards to performance tests used in conjunction with volumetric properties for asphalt mixtures. One of the

suggestions for future research identified by the authors is "Guidance to agencies and contractors on how to successfully implement the use of [Performance-Based Specifications] for asphalt mixtures." This proposed research would help achieve this goal.

The SHRP2 report "Strategies for Implementing Performance Specifications: Guide for Executives and Project Managers" provides excellent guidance on high-level implementation strategies considering organizational, cultural, legal, and project delivery considerations. It identifies areas for agencies to consider regarding sampling, testing, and acceptance/payment, but does not drill down to provide guidance on these issues.

McCarthy, Leslie Myers; Callans, Jonathan; Quigley, Robert; Scott III, Sidney V.: "Performance Specifications for Asphalt Mixtures" - Transportation Research Board, NCHRP Synthesis 492, 2016.

Scott III, Sidney; Konrath, Linda; Ferragut, Ted; Loulakis, Michael C.: "Strategies for Implementing Performance Specifications: Guide for Executives and Project Managers" - SHRP2 Report S2-R07-RR-2, 2014.

Scott III, Sidney; Konrath, Linda; Ferragut, Ted; Anderson, Stuart; Damnjanovic, Ivan; Huber, Gerald; Katsafansa, Jim; McGhee, Kevin; Sprinkel, Michael; Ozyildirim, Celik; Diefenderfer, Brian; Merritt, David; Dawood, Dan; Molenaar, Keith; Loulakis, Michael C; White, David; Schaeffer, Vernon R.: "Performance Specifications for Rapid Highway Renewal" - Transportation Research Board, SHRP2 Report S2-R07-RR-1, 2014.

Each of the studies referenced below provide information regarding test methods, quality control and acceptance procedures, and recommended specifications, but none of them provide guidance on implementing performance specifications while considering all the core elements of a quality assurance program.

Smith, D.; Lee, S.B.; Kazmierowski, T.: "Development of Performance Specifications for Flexible Pavements in Ontario" - Proceedings of the Sixtieth Annual Conference of the Canadian Technical Asphalt Association, 2016.

Grobler, J.; Rebbechi, J.; Denneman, E.: "National performance-based asphalt specification framework" - Austroads Project APT1953, 2018.

"Report on Performance-Based Requirements for Concrete" – American Concrete Institute, 2015.

V. RESEARCH OBJECTIVE

Develop a guide to assist public transportation agencies with implementation of performance specifications for asphalt and concrete materials.

Possible tasks include:

Task 1 – Literature review.

Task 2 - Provide clear, consistent definition of terms related to performance specifications.

Task 3 - Identify existing test methods and mix design procedures that are likely to be included in performance specifications for asphalt and concrete. Include those tests and procedures from SHRP2 R07 "Guide Performance Specifications."

Task 4 - Determine the impact of implementing these tests and procedures on DOT QA programs, including: technician training and certification; laboratory accreditation; Lot and sublot sizes; material sample sizes; turnaround time for test results; cost of testing; applicability of various tests for design approval, process control, quality control, acceptance; IA procedures; dispute resolution process.

Task 5 - Develop guidance for agencies to use during implementation of performance specifications. Include guidance on setting up pilot projects/shadow specifications, setting appropriate control and specification limits, and suggest ways to gain buy-in from agency and industry personnel.

Task 6 - Publish the final guide as a draft AASHTO recommended practice.

VI. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding:

$400,000.00

Research Period:

24 months

VII. URGENCY AND POTENTIAL BENEFITS

Performance specifications have the potential to dramatically improve the long-term durability of pavements and structures. Even a small increase in project life would result in millions of dollars in annual savings for state DOTs. Guidance on proper implementation of performance specifications could help avoid early failures which could slow or prevent implementation, and could help minimize risk to DOTs and contractors.

VIII. IMPLEMENTATION PLANNING

Implementation of the guide will be accomplished through presentations at the AASHTO Committee on Materials and Pavements, adoption as an AASHTO recommended practice, and through presentation at various regional and national meetings and conferences, including the TRB annual meeting. Challenges will include aversion to the real or perceived risks by both agencies and contractors, lack of trained personnel, and cost of associated equipment, training and specification development. Inconsistent terminology related to QA and performance specifications will present challenges by inhibiting effective communication at the national level.

IX. PERSON(S) DEVELOPING THE PROBLEM STATEMENT

Rick Bradbury, Director of Materials Testing and Exploration, Maine Department of Transportation
Tel: (207) 624-3482
Richard.bradbury@maine.gov

Dr. Dimitrios Goulias
Associate Professor
Director of Undergraduate Studies
Civil & Environmental Engineering Department
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O147 G.L. Martin Hall, College Park, MD 20742
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X. AASHTO MONITOR

XI. SUBMITTED BY

Rick Bradbury, Director of Materials Testing and Exploration, Maine Department of Transportation
Tel: (207) 624-3482
Richard.bradbury@maine.gov

Please submit completed problem statement at:

http://bit.ly/NCHRP2018Submittal

Questions on the process can be directed to chedges@nas.edu.

AASHTO STANDING COMMITTEE ON RESEARCH
AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

NCHRP Problem Statement Outline

I. PROBLEM NUMBER

To be assigned by NCHRP staff.

II. PROBLEM TITLE

Manual for Incorporating NDT in Quality Assurance

III. RESEARCH PROBLEM STATEMENT

To date state highway agencies (SHAs) routinely accept highway materials based on quality assurance (QA) procedures. These QA procedures are based on certifications and material requirements, a variety of material specifications (method, end-result and performance requirements) and acceptance plans, which are part of a QA program. These quality assurance requirements consider in most cases the federal regulations for construction QA procedures 23 CFR, Part 637B, the Federal Highway Administration (FHWA) recommendations on developing QA programs, and AASHTO recommendations for QA.

Several studies have identified the potential advantages of incorporating nondestructive testing (NDT) into the QA process for highway materials. Use of NDT methods provide "added value" in the QA process since they allow for: quickly assessing product uniformity in real-time as construction progresses; identification of potential defects during construction allowing for quick corrective actions; inspection/testing at higher frequency and replication without destructive or damaging effects related to coring and other destructive testing; and thus, can lower testing and inspection cost while improving construction quality and available data for SHAs to use in the acceptance process. In regards to concrete, NDT methods are able to evaluate concrete properties and uniformity, honeycombing and segregation, cover depth, and detect reinforcement location and characteristics. Similarly, in asphalt mixtures NDT methods can identify thermal uniformity, density and stiffness. While several NDT test methods have been explored for several years, the transition from research and forensic investigations to QA has been somewhat limited because of either the complexity of such methods or lack of required training by QC technicians and agency inspectors.

IV. LITERATURE SEARCH SUMMARY

American Concrete Institute, ACI, "ACI 228.2R-13 Report on Nondestructive Test Methods for Concrete in Structures." Pp. 53-61. Farmington Hills, MI 2013.

Breysse, D., G. Klysz, X. Dérobert, C. Sirieix, and J. F. Lataste. "How to Combine Several Non-Destructive Techniques for a Better Assessment of Concrete Structures," Cement and Concrete Research, vol. 38, no. 6, pp. 783–793, 2008.

Federal Highway Administration, FHWA. "Nondestructive Evaluation (NDE) Web Manual." Washington D.C. 2016.

Lim, M., and H. Cao. "Combining Multiple NDT Methods to Improve Testing Effectiveness," Construction and Building Materials, vol. 38, pp. 1310–1315, 2013.

National Cooperative Highway Research Program (NCHRP) Report 626: "NDT Technology for Quality Assurance of HMA Pavement Construction." 2009.

National Cooperative Highway Research Program (NCHRP) Report 626 Volume 2: "NDT Technology for Quality Control and Acceptance of Flexible Pavement Construction." 2008.

Strategic Highway Research Program (SHRP 2) Report S2-R06A-RR-1: "Nondestructive Testing to Identify Concrete Bridge Deck Deterioration." 2016.

Verma S.K., Bhadauria S.S., and S. Akhtar. "Review of Nondestructive Testing Methods for Condition Monitoring of Concrete Structures." Journal of Construction Engineering. Volume 2013, article #834572, 11 pp. 2013.

V. RESEARCH OBJECTIVE

Develop a manual to assist state highway agencies with the development and implementation of Quality Assurance Plans incorporating Non Destructive Testing.

Possible tasks include:

1) Literature review. This should include: i) an overview of existing Quality Assurance procedures in place for concrete and asphalt materials for highway applications; ii) review the current practice in NDT methods applicable to asphalt and concrete materials for highway applications.
2) Identify NDT methods that are likely to be included in quality control (QC) and acceptance testing for asphalt and concrete. Objective of this review does not include any NDT experimental testing but rather to review the knowledge and results with NDT methods available in practice.
3) Recommend QA program(s) incorporating NDT for asphalt and concrete materials in function of the specific highway applications. NDT methods could be considered for adoption into a QA process during: quality control testing by the contractor; and, inspection, verification and acceptance testing by SHA inspectors. Determine the impact of implementing these NDT tests and procedures on SHA QA programs, including: technician training and certification; laboratory accreditation; Lot and sublot sizes; material sample sizes; turnaround time for test results; cost of testing; applicability of various tests for process control, quality control, acceptance; IA procedures; dispute resolution process; and cost/benefits analysis assessment.
4) Develop a guidance manual that provides an overview of the current practice of NDT methods applicable to concrete and asphalt mixtures along with a brief description of the principles of operation, detection capabilities, potential benefits, and, associated limitations and drawbacks. Objective of such manual is not to recommend to SHAs any specific NDT method but rather to illustrate the features of different methods and how they are applicable to QA. Include guidance for agencies on the: development and implementation of NDT based QA procedures; on setting up pilot QA procedures before full scale implementation; assessing appropriate control and specification limits, and suggest ways to gain buy-in from agency and construction personnel.
5) Develop an implementation plan, publish the final guide as an AASHTO recommended practice and provide workshops and webinars to SHAs and FHWA personnel.

VI. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding:

$250,000.00

Research Period:

24 months

VII. URGENCY AND POTENTIAL BENEFITS

NDT based QA plans have the potential to dramatically improve the quality of accepted highway materials and reduce SHA buyer risk since they allow for: quickly assessing product uniformity in real-time; identification of potential defects during construction allowing for quick corrective actions; inspection/testing at higher frequency and replication without destructive or damaging effects; and thus, can lower testing and inspection cost while improving construction quality and reducing SHA buyer risk and potential for contract litigation. The long-term effects of higher quality construction will be improved durability and performance of highway structures, which would result in millions of dollars in savings for state highway agencies.

VIII. IMPLEMENTATION PLANNING

Implementation of the guide will be accomplished through presentations at the AASHTO committees pertinent to materials, pavements and bridges, adoption as an AASHTO recommended practice, workshops and webinars to SHAs and FHWA personnel, and through presentation at various regional and national meetings and conferences, including the TRB annual meeting.

IX. PERSON(S) DEVELOPING THE PROBLEM STATEMENT

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Please submit completed problem statement at:

http://bit.ly/NCHRP2018Submittal

Questions on the process can be directed to chedges@nas.edu.

TRANSPORTATION POOLED FUND PROGRAM
PROPOSED STUDY

TITLE

Building Information Modeling (BIM) for Pavements

PROPOSED YEARS OF STUDY

Five years. (2019 – 2023)

PROPOSED LEAD AGENCY

Wisconsin Department of Transportation

Contact: Lance Parve, Lance.Parve@dot.wi.gov

PARTNER AGENCIES

Minnesota Department of Transportation

Contact: Curt Turgeon, curt.turgeon@state.mn.us; Rebecca Embacher, rebecca.embacher@state.mn.us

STUDY DESCRIPTION

Background

Building Information Modeling (BIM) has been proven successful in the vertical industry involving structures-buildings by integrating design-construction data resulting in benefits such as improved efficiency and cost saving. BIM is being increasingly used for the horizontal industry involving infrastructure. BIM for Pavements (BFP) is a new area in infrastructure applications with the potential to achieve improved benefits for pavement construction by linking the life-cycle of pavements: planning, design, surveys, construction, real-time monitoring, acceptance tests, condition surveys, maintenance and rehabilitation. However, there is lack of understanding/training of BFP, roadmap, data standard, and public domain BFP software to implement BFP for DOTs.

Objectives

- Develop BFP guidelines and public main tools to assist DOTs for BFP implementation,
- Form partnership between DOTs and industry to advance BFP technologies,
- Assist DOTs with enhancing financial effectiveness by improving efficiency and cost saving in pavement design, construction, and maintenance with BFP.

Scope of Work

1. Develop BFP paper to define the roadmap and framework for DOTs to implement BFP (including step-by-step implementation plan – scope, budget, schedule, features and phases.)
2. Form an Expert Task Group (ETG) for BFP (including non-voting industry members: AutoDesk, Bentley, Kiewit, etc.)
3. Conduct ETG Meetings to steer the visions and direction of implementation of BFP roadmap
4. Identify ready-to-implement Intelligent Construction Technologies (ICT) for BFP implementation (e.g., Intelligent Compaction, Paver-mounted Thermal Profiles, LiDAR-based roadway surveys)
5. Implement Open Source Intelligent Construction Technology (ICT) data standards and schema for vector 2D/3D data files - specifically for pavements - to facilitate implementation of BFP (e.g., LandXML and Industry Foundation Class - IFC)
6. Develop public domain BFP software for DOTs and industry users (e.g, Extend the public domain software, Veta, to analysis of in-progress and as-built pavement layer properties and to feed BFP these essential data for implementation. Thus, DOTs make use of the public domain Veta-BFP to integrates raw ICT machine data with design/alignment data to produce pavement lifts/layer properties for GIS, CAD, and BIM)
7. Develop case studies and practical training materials for BFP
8. Conduct webinars and lecturer-led BFP training for DOTs (including DOT policy makers and design/construction/maintenance/PMS departments)

Comments

Recommended Funding: $NNN,000 to start with---total needed $NNN,000.

We are looking for 6 states to contribute $25,000 per year for five (5) years.

APPENDIX A: ACRONYMS AND TERMS

BFP BIM for pavements

BIM Building Information Modeling

CAD Computer-Aided Design

GIS Geographic Information System

IC Intelligent Compaction

ICT Intelligent Construction Technologies

IFC Industry Foundation Classes for exchanging relevant data between different software applications and is at the heart of openBIM

LiDAR Light Detection and Ranging

PMTP Paver-Mounted Thermal Profiles