

FHWA Asphalt Mixture and Construction Expert Task Group

Mixture & Construction ETG Purpose

The primary objective of the FHWA Expert Task Group is to provide a forum for the discussion of ongoing asphalt mixture technology and to provide technical input related to asphalt mixtures design, production and construction.

A total of 54 individuals attended the meeting (16 members, 38 visitors). Members of the FHWA Asphalt Mixture and Construction ETG that were in attendance at the September 2009 meeting included (Attachment A is the meeting Agenda and Attachment B includes a listing of the ETG members):

Frank Fee, NuStar Asphalt (Chairman)
Ray Bonaquist, Advanced Asphalt Technologies (Co-chairman)
John Bukowski, FHWA (Secretary)
Shane Buchanan, Vulcan Materials Co.
Ervin L. Dukatz, Jr., Mathy Construction Company
John Haddock, Purdue University
Kevin D. Hall, University of Arkansas
F. M. Rick Harvey, Wyoming DOT/AASHTO SOM liaison
Gerry Huber, Heritage Research Group
Reid Kalser, Nevada DOT
Julie Kliewer, Arizona DOT
Todd Lynn, Old Castle Co.
Kevin Van Frank, Utah DOT
Michael Anderson (Liaison), Asphalt Institute
Mark Buncher (Liaison), Asphalt Institute
David Newcomb (Liaison), National Asphalt Pavement Association

Meeting Coordinator: Lori Dalton (SME, Inc.)

Meeting Notes: Harold L. Von Quintus, (ARA, Inc.)

“Friends” of the ETG that were in attendance included:

Chris Abadie, Louisiana DOT	Richard May, Shell Solutions
Michael Arastech, FHWA	Karissa Mooney, NuStar
Haleh Azari, AMRL	Steve Mueller, FHWA
Gaylon Baumgardner, Paragon Tech. Services	Ioan Negulescu, LSU
Satish Belagutti, FHWA/ESC	Hal Panabaker, DuPont
Jim Bibler, Gilson Company	Chuck Paugh, ESC, Inc.
Audrey Copeland, FHWA	Katherine Petros, FHWA
Matthew Corrigan, FHWA	Roger Pyle, Pine Instruments
John D’Angelo, D’Angelo Consulting	Ajay Ranka, Zydrex Industries
Raj Dongre, ESC, Inc.	Dick Reaves, Troxler
Gary Fitts, Shell Solutions	Ali Regimanl, InstroTele, Inc.
Nelson Gibson, FHWA	Gerald Reinke, Mathy Construction

Beth Griffin, DuPont
Ellie Hajj, University of Nevada at Reno
Tom Harman, FHWA
Sang Soo Kim, Ohio University
Dal Little, Kraton Polymers
Robert Lytton, Texas A&M University
Rong Luo, Texas A&M University

Pedro Romero, University of Utah
Geoff Rowe, ABATECH
Scott Veglahn, Mathy Construction
Eric Weaver, FHWA
Jack Youtcheff, FHWA

Monday, September 14, 2009

1. Call to Order – Chairman Frank Fee called the meeting to order at 8:00 AM.

Welcome and Introduction – Frank Fee (NuStar Asphalt) welcomed the group to the meeting. Self introductions were made, and the attendance sign-in sheets were distributed to log attendance. The ETG meeting was being web cast.

Lori Dalton discussed various administrative arrangements, and reported that the shuttle schedule was passed out prior to the meeting.

Fee thanked John Casola and Malvern Instruments for hosting the web cast of the ETG Meeting which was made available for those who couldn't attend.

2. Review Agenda, Meeting Minutes, and Action Items – John Bukowski (FHWA)

John Bukowski noted that the meeting agenda previously distributed via e-mail has not changed and that the minutes from February 2009 meeting had also been distributed prior to the meeting.

Secretary Bukowski reviewed the meeting agenda (Attachment A) and action items from the February, 2009 Mix and Construction ETG meeting. The first day topics on the agenda will address most of the action items from the previous meeting. Topics for the second day are items related to technology changes.

The following is a listing and status of the action items from the previous ETG meeting.

- 1) Jim Musselman will re-write the procedure to measure the gyratory compactor mold wear in a format appropriate for inclusion as an annex to AASHTO T312 and send to Fee and Bukowski for ETG distribution. ETG members should provide comments to Musselman by mid-April. Final version should be sent to Rick Harvey, Fee and Bukowski by May 1.

UPDATE: Action item is on the agenda. Erv Dukatz will make a presentation on this action item because Jim Musselman could not attend. Frank Fee mentioned that Roger Pyle also contributed significantly to this activity.

- 2) Ray Bonaquist with assistance of the AMPT Task Group (Blankenship, Copeland, Dongre, Hajj, Kim, Tran, Van Frank, and Von Quintus) will prepare a draft white paper on gathering data and specimen preparation for the recommended "Flow Number

Procedure.” Send to Fee and Bukowski for ETG distribution and discussion at the next meeting.

UPDATE: Action item is on the agenda. Progress made on gathering data from flow number test will be presented by Bonaquist.

- 3) Richard Kim will prepare a cost analysis/schedule plan for performing ruggedness testing on the IDT modulus testing procedure. Kim will report on the status at the next meeting.

UPDATE: Action item is on the agenda. This will be a discussion topic—no formal presentation, because Richard Kim could not attend this meeting.

- 4) Brian Prowell and Gerry Huber are requested to summarize their recommendations regarding gyratory N_{design} levels and send to Chairman Fee and Secretary Bukowski for ETG distribution and determine if any further discussion or action is needed by the ETG.

UPDATE: Action item is on the agenda. John D’Angelo will be making the presentation summarizing the information on this topic.

- 5) John D’Angelo will present at the next meeting a procedure that could be performed by agencies to analyze a mixture to evaluate the effects of lowering gyratory levels.

UPDATE: This action item is on the agenda; presentation to be made by D’Angelo.

- 6) Randy West will prepare a summary of the recommendations from the Specific Gravity Task Group for possible AASHTO specification changes and send to Chairman Fee and Secretary Bukowski for ETG distribution and discussion at the next meeting.

UPDATE: Action item is on the agenda. This will be a discussion topic on some of the issues from the task group members.

- 7) Jim Musselman will send to Chairman Fee and Secretary Bukowski the results of the Florida DOT mixture conditioning study for discussion by the ETG members at the next meeting.

UPDATE: Action item is on the agenda. Frank Fee will make a brief presentation about the issues.

3. Subcommittee on Materials: AASHTO Standards Update Report – Rick Harvey (Wyoming DOT); Liaison for the AASHTO Subcommittee on Materials

Summary of Presentation:

Introductory comments:

- Subcommittee on Materials Annual Meeting was held on August 2-7, 2009 in Anchorage, Alaska.

- The next AASHTO Subcommittee on Materials meeting is scheduled for August 2010 in Madison, Wisconsin.
- Ballot sent out in November 2008; the standards that were approved were published in July 2009.

T 312 – Only minor changes made to standard regarding comments from the 2007 ballot.

- AMRL enforcement on use of internal angle
- Internal angle was approved on 2007 SOM ballot, it was published in 2008 edition. After December 2010, lab cannot be accredited, if it does not have the ability to evaluate the SGC internal angle.

T 209 – Determination of Voidless Unit Weight.

- Mechanical agitation required; Bukowski reported that there was discussion about eliminating manual agitation, but that did not pass. Information on variable speed of mechanical agitation was presented. One state presented data on the use of mechanical agitation, and especially the degree and frequency of agitation and its effect on the variability. NCHRP 9-26 effort is considering doing a laboratory study to evaluate the effect of mechanical agitation. ARML will not require mechanical agitation, and will not withdraw accreditation until this issue gets resolved.

PP 48 – Evaluation of the Superpave Gyratory Compactor Internal Angle of Gyration; this procedure one will be discontinued—there were no negatives or comments.

TP 71 – Evaluation of Superpave Gyratory Compactor (SGC) Internal Angle of Gyration Using Simulated Loading was accepted by SOM, no remaining issues.

NCHRP 9-29, AMPT – All four new provisional standards were accepted, have numbers, and are now published (TP 79, PP 60, PP 61, and PP 62).

TP 79 – Determining the Dynamic Modulus and Flow Number for HMA Using the AMPT; No negatives, but some comments that will need to be discussed. Moved to the 2009 SOM balloting.

An issue raised was whether there should be section on equipment calibration.

Considerable ETG discussion followed on the issue of AMPT calibration. Should recommendations be included in the test procedure, and if so, then how much detail is needed.. Ray Bonaquist commented that calibration is critical to the test. There is an equipment specification in the 9-29 report but issue becomes complicated regarding calibration of and individual manufacturer's equipment. Fee asked about the amount of detail that should be included relative to calibration. Bonaquist recommended that the entire equipment 9-29 equipment specification be available for everyone to review prior to doing calibration.

Fee asked if there is a concise write-up on calibration. Bonaquist response was that there is an example in the NCHRP 9-29 report. Fee requested that Bonaquist provide a write-up on what is actually required for calibration. Bonaquist noted that this does not apply to TP 62; many of those calibration requirements (in TP62) are inappropriate. In summary, suggestion was to ensure that the AMPT is properly calibrated.

Kevin Van Frank reported that the Utah for calibration was relying on the individual equipment manufacturer to set up/calibrate the equipment. However, it would be helpful to have a document on the calibration requirements.

Noted that equipment calibration can be very complicated, it needs to include the verification procedures, calibration intervals, etc. just like for the DSR. Asked if the DSR is a model that we need to follow; complicated equipment and calibration should be based on what has been done in the past.

Ray Bonaquist also noted that there is a misunderstanding on how the test conditions/parameters were initially developed and provided in the test procedure. The testing conditions were not originally defined. Bonaquist's goal was to identify the testing conditions directly. For the dynamic modulus, testing conditions are provided, but for flow number the testing conditions have not been established. Was noted however, that the equipment operation procedure should not identify certain criteria such as the confining pressure - these type parameters need to be in the specification, not in the operational procedure such as TP79. This procedure (TP79) should only focus on how to run, for example a confined test.

ACTION ITEM Ed Harrigan will be asked to provide a copy of the AMPT equipment specification developed under 9-29 to the ETG and that Ray Bonaquist will provide a write up on what is actually required for calibration.

Two additional items on TP79 were;

- Rick Harvey reported that a ballot will be issued to delete the note concerning air void tolerances and put that note in the procedure. Air void tolerances should be mandatory, rather than included as a note.
- Rick Harvey suggested that Kevin Van Frank's recommendation about the venting procedure should be added. This will be added to the method.

PP 61 – Dynamic Modulus Master Curves for HMA Using the AMPT. No negatives and only one comment about air voids tolerances. There are only a few individuals actually using it or have the equipment. The amount of comments may increase over time, as more individuals start using the equipment. The scope for the method was revised and expanded. Rick Harvey asked Audrey Copeland when the equipment will be purchased for the pool fund study. Copeland noted that it is expected to start delivery of equipment in the Spring of 2010, to the 18 states are already committed to the pooled fund. However, not all of these States have actually transferred

the required funds to the pool fund. Several states who are members of the pool fund study already are using the AMPT.

Rick Harvey reported that with all of the discussions and revision, we are already in the 2011 publication cycle. Harvey sees three things that have been on the table from the ETG; T 312, TP 62, and specific gravity recommendations. The specific gravity items are on an old ballot and will need to take action on them – they will be extended for a year, but then some action will need to be taken on these standards.

4. Procedure to Measure the SGC Mold Wear – Jim Musselman and Erv Dukatz

Prior to the report, Frank Fee reviewed what has been done on this topic, and reported that the draft annex procedure had been distributed to ETG members for comment. Erv Dukatz will now go through the procedure, give an update on its status, and identify the remaining issues.

Presentation Title: *Annex 1 – Evaluating Superpave Gyratory Compactor Molds*

Summary of Presentation:

Committee was formed to identify how to measure the inside diameter of the mold. On the top part of the mold, not much wear occurs and typically will meet requirements. Jim Musselman drafted a procedure for measuring the inside diameter at three locations within the SGC mold. Roger Pyle helped edit that draft procedure and to put it in an appropriate AASHTO format.

Which measuring device should be used to evaluate the internal mold diameters. Current procedure only gives the tolerances of the devices. Two legged bore gauge versus three legged bore gauge. The 3-legged gauge is much more costly. The cost difference between the two gauges is several thousand dollars. The two-legged gauge determines elongation better than the 3-legged bore gauge. The 3-legged bore gauge, however will self center itself and is easier to use. The 3-legged bore gauge is digital and checks for eccentricity. The group recommended the 3-legged bore gauge even though it is more expensive, because there is less chance of making incorrect measurements.

Noted that the cost of these measuring devices is about 10% of cost of a gyratory compactor but you only need one for an organization (company or state). Noted that when you are measuring something, your device needs to be 10 times more than the tolerance of the magnitude you are trying to measure, so the accuracy of the two gauges becomes very important. The measuring procedure currently refers to the 3-legged device. Bukowski commented that not to lose focus that the first issue is to establish a procedure for measuring internal mold wear and have that adopted by AASHTO as part of T312.

Rick Harvey requested that something be put together that provides discussion on how we came to this conclusion for the future SOM ballot that can be sent out prior to the ballot. Task Group recommendation is to utilize the 3-legged and why we need this.

Dukatz noted that you must store the top and bottom plates separate. Keep a set of top and bottom plates for each mold. You calibrate the gyratory to one mold. Then on a daily basis you use the actual molds, measure the angle; assuring that it is within the tolerance of the internal angle. Thus, you are sure you are not going to have a significant difference in G_{mb} between the molds. This is a quick way to check all molds you are using at the beginning or end of the paving season.

Ali Regimand asked how does the end user check the values during the construction season when you purchase a new mold. If it is a brand new mold, then using this procedure was probably not necessary. If you have two molds that give different results on the G_{mb} , then you need to check it.

- Remaining document is straight forward.

Dukatz noted that the task group put together, along with the procedure, brief statements on why the recommendations were made and where they came from, and then submit to Rick Harvey for moving forward. Gerry Huber commented that need to again check sections C3 and H3 prior to doing this, appears to be an error. Roger Pyle agreed to correct those sections. Dukatz and the Task Group will correct the issues raised by the ETG.

ACTION ITEM (2): Task Group Erv Dukatz, Kevin Hall, and Roger Pyle, will provide a one page explanation of the mold wear to the annex. The annex will be forwarded to Rick Harvey prior to issuing the ballot for T 312. The new operational tolerances will be added to T 312 prior to the next ballot.

5. AMPT Flow Number Testing Task Group Status Report – Ramon Bonaquist (AAT)

Task Group Members: Ramon Bonaquist, Haleh Azari, Phil Blankenship, Audrey Copeland, Elie Hajj, Kevin Hall, Richard Kim, Nam Tran, Raj Dongre, Kevin VanFrank, and Harold L. Von Quintus.

Title of Presentation: *AMPT Flow Number Task Group Status Report*

Summary of Presentation and ETG Discussion:

Ray Bonaquist contacted all members of the task group to identify different projects where the Flow Number test was used for estimating rutting resistance. Bonaquist reported that Nam Tran (NCAT) was to present the results from the NCAT test track and summarize what they have done to date. But, Nam Tran could not attend the meeting. Bonaquist will present what AAT has done in the past. Bonaquist reported that the group was to prepare a practice document providing guidance on how to conduct Flow Number test.

Definition & History of Test – Bonaquist reviewed the definition for Flow Number and how it evolved from NCHRP 9-19 regarding Matt Witczak's work. He also showed some of the NCHRP 9-19 data from which the test was recommended. Bonaquist reported that this previous effort was unable to develop a universal relationship between all mixtures under NCHRP 9-19. Noted only one temperature was used in the early work.

Task Group was to produce guidelines or a practice to document how to conduct the Flow Number test, not necessarily how to predict rutting with a model such as the MEPDG. Data from the Flow Number test is more of an index rather than a fundamental property. Bonaquist listed the characteristics of the test.

Since the last ETG meeting, many of the issues on the Flow Number procedure have yet to be answered and need to be addressed prior to determining the criteria from the test. These are issues that must be done prior to putting together an AASHTO practice.

Shane Buchanan reported that NCAT has done a lot of creep testing on HMA mixtures. Also noted that a number of laboratory studies have been completed but using different testing conditions. Noted that the FHWA mobile lab has gathered flow number data from various projects and has attempted to relate this to mix properties. Currently, minimum data exists to relate flow number to mixture properties (VMA, air voids, VFA, gradation, etc.). More of this type of effort is needed to confirm the relationship and establish test criteria.

Concerning the confinement, Bonaquist replied that the data being presented are unconfined tests. Bonaquist defined the testing conditions; unconfined test with an axial stress of 600 kPa at a temperature of 50% average 7-day temperatures from LTPP bind 3.1, and specimens compacted to 7% air voids.

There was considerable discussion during the ETG on the issue of flow number testing criteria. The appropriate testing temperature was discussed. It was asserted that testing temperature should not be based on binder grade because of polymer modified mixtures having a higher grade based on temperature—it should be based on stiffness of binder. Also noted that the AMPT equipment cannot test at temperatures much above 60C.

Bonaquist also reported that data from Nam Tran (NCAT) shows that flow number increases with design traffic level. Bonaquist noted that Tran has a TRB paper this year related to this effort. Shane Buchanan (Vulcan Materials) asked about the testing conditions in terms of stress state. Ellie Hajj has used different stress states, and noted that these have yet to be standardized. Two different conclusions have been presented in terms of what the stress states should be, but these need to be standardized in some form.

Bonaquist reported that the NCHRP 9-26 efforts will fund through Haleh Azari (AMRL) an experimental design on these issues. Frank Fee requested that the group provide the experimental plan for presentation to the ETG. Action item is to develop an experimental plan for evaluating flow number and what criteria impact flow number.

Nelson Gibson noted that FHWA reported on testing completed a couple of years ago related to volume change and defining the flow number for the ALF mixtures. The ALF mixtures always dilated, none went into tertiary flow. This data is in an AAPT paper. Two confinements were used. Permanent deformation gave the same ranking as the rutting observed. Gibson will provide Bonaquist with this data and could present this at the next ETG meeting

Fee noted that time of loading is also an issue (the speed of the traffic will need to be considered). Bonaquist mentioned that it is considered directly in Ellie Hajj's procedure and indirectly considered in the NCHRP 9-33 procedure. Also currently being evaluated by Peter Sebaaly as part of an Asphalt Research Consortium effort.

Ellie Hajj asked what procedure was used to define flow number. Bonaquist answered that the Franck model was used as the fitting model. The large variability is caused by some of the test specimens that do not flow within the testing scheme. Hajj mentioned that they increased the number of repetitions for different test temperatures for the WesTrack mixtures and found that the speed, temperature (critical), and pavement structure affect the flow number. Kevin Van Frank mentioned that Utah found or concluded that there was a critical temperature from their Hamburg testing project. D'Angelo noted that this can be simplified when used in terms of a mix design tool or parameter. Hajj noted that the critical conditions still needed to be known and these could be mix dependent. Bonaquist asked Hajj about details of his test. Eventually they will be looking into finding the critical testing conditions that relate back to actual conditions.

D'Angelo noted that our previous practice for mix design had been to design mixtures that meet certain requirements, which did not mean that they were always good mixtures. We are now trying to relate mixture and structural design. One is empirical while the other is more mechanistic—there will still be uncertainties. Noted then that this might eventually just be a proof test. The amount of mixtures that get rejected is going to depend on how conservative the agency wants to be.

Gerald Reinke noted that they see a lot of difference in terms of different testing conditions. He believes that we need to be running at different stress levels. Nelson Gibson noted that his opinion initially was that you had to use realistic stress conditions, but has come to believe that to use realistic stress states you significantly increase your testing time and decrease machine life.

Bonaquist will present an update of the Task Group activities at the next meeting. Nelson Gibson is to be added as a member of the Task Group.

ACTION ITEM (3): Develop a work plan for identifying the flow number parameters for mix design and presented at the next ETG meeting. The work plan should be distributed to the ETG prior to the next meeting.

6. Report on IDT E* Ruggedness Testing Plan – Richard Kim (NCSU)

No formal presentation, because Richard Kim could not attend the meeting.

Frank Fee reported that the group was to derive a ruggedness testing plan from the last meeting. Richard Kim presented a ruggedness plan overview at the last meeting, but it needed to be more focused. Richard Kim did identify the factors to be used in ruggedness plan, but it is just in a power point presentation. More information is needed for the ETG to comment. The plan

included a potential working group of three agencies (NCAT, FHWA, and NCSU). Sample preparation for this effort could be completed under NCHRP 9-26 (AMRL) project.

Bukowski noted that the ETG could comment on the plan, but up to individual members if they wanted to participate in the testing. Fee asked Kim to finalize the ruggedness plan and submit it to ETG for comment. The plan needs to follow the ASTM requirements for developing a ruggedness plan.

Bonaquist reported that Kim has done a lot of work through the appropriate TRB committee. One issue for the ETG is to provide input using the IDT test instead of the 4x8 samples for characterizing HMA mixtures. Bonaquist's opinion is that Kim has provided sufficient data to show that this is a viable solution. Kim is attempting to calibrate the MEPDG through the use of field cores in the IDT test.

ACTION ITEM (4): Richard Kim will prepare a written ruggedness plan for measuring E* and provide to the ETG for comment. He will give a presentation at the next ETG meeting to explain the factors included in the experimental ruggedness plan.

7. Presentation Title: Gyration Levels: Where Do We Go? – John D'Angelo (D'Angelo Consulting) and Gerry Huber (Heritage Research)

Theme of presentation, before adjusting gyration levels, perform performance testing and decide on the best N-design for the agency's typical aggregate. John D'Angelo reviewed the SGC gyrations that had been used and why some agencies were reducing the number of gyrations.

Reducing the gyration level can potentially affect the performance of the mix. D'Angelo included some of NCHRP 9-9(1) summary slides that were presented last year. One slide that showed the large variability, even after the outliers had been removed. D'Angelo's emphasis is that there is no one perfect gyration level to be used. All aggregates are not created equally, there are differences. There is no one set of numbers; they are empirical numbers, especially when you look at a values on a national basis. If it is decided by an Agency that a departure is needed from their currently used N-design, then take the numbers included in the national table and evaluate. This can be done using empirical tests, such as the APA and Hamburg wheel testing devices or more fundamental testing with the AMPT. Thus suggesting some analysis before making the change or determining what change needs to be made.

Some agencies have done performance testing to determine what the change are needed, while some have simply lowered the gyration level, but have not followed up whether the change was resulted in an improvement. In one instance, an Agency changed N-design. As they had anticipated, the mixture asphalt content under a lower gyration level initially went up about a 0.5% but then over time went back down. What happened is that designers were designing at lower VMAs over time. Opinion is, if goal is more asphalt in a mix, just increase the VMA.

There is no recommendation from the ETG support/agree with the NCHRP 9-09 change in the N-design gyration levels. This is an empirical system that is not perfect for every condition. No

one study will be detailed enough to confirm the NCHRP 9-09(1) recommendations. Bukowski reiterated that while the ETG cannot confirm a reduction or what that should be, what may be needed is a white paper to capture some of the discussion within this group that the ETG could agree on regarding the gyration values.

Frank Fee requested the SGC Task Group (John D'Angelo, Gerry Huber, Randy West, Brian Prowell, Kevin Hall, and Julie Kliewer) put together a commentary on this issue prior to the next ETG meeting.

ACTION ITEM (5): Gyrotory Level Commentary Task Group (Fee, D'Angelo, Huber, West, Prowell, Hall, and Julie Kliewer) will develop a "stand-alone" summary/commentary document on approaches and impact for lowering N-design.

8. Specific Gravity Task Group Report – Kevin Hall (University of Arkansas) and Randy West (NCAT)

Since Randy West could not attend, Kevin Hall made the presentation. The task group report was distributed to the ETG prior to the meeting and will be submitted as an E-circular before the next meeting.

Kevin Hall noted no activities since the last report was submitted. The following is a summary of the recommendations included in the Task Group report.

1. Methods for determining G_{sb} of coarse aggregate are considered satisfactory in terms of precision and bias; no changes warranted; future research should explore reducing soak time.
2. Methods for determining G_{sb} of fine aggregate have poor reproducibility (subjective SSD condition). Accuracy of G_{sb} is questionable for absorptive materials, highly angular or textured particles, high dust contents; more research is needed to improve on reproducibility and accuracy; alternate methods seem to have promise.
3. Limits for VMA, VFA, as used in mix design or HMA acceptance plans, should be based on well documented precision information of G_{sb} values.
4. Current methods for G_{mm} of HMA mixes with low absorption aggregates are satisfactory; this is not true for mixes with moderate to highly absorptive aggregates; more work is needed to improve on reproducibility of the G_{mm} values; the other focal point of future work is to reduce time to run the test for mixes with absorptive aggregate.
5. To improve on accuracy of G_{mb} values – the SSD method should be limited to specimens with water absorption less than or equal to 1.0%. For specimens with more than 1.0% water absorption, the vacuum sealing method should be used.
6. If recommendation #5 is accepted, raise the minimum VMA criteria in M323 by 0.5% for coarse-graded mixes.
7. If recommendation #5 is accepted, lower the minimum in place density criteria for coarse-graded mixes by 1.0% and the minimum in place density criteria for SMA mixes by 1.7%.

For item #5, the task group recommended that the SSD method not be used for high absorption aggregates. Also recommended parafilm coating over vacuum sealing and that the absorption be reduced from 2 to 1 percent. Hall noted we would like to move forward with their recommendations. Frank Fee reported that this was his fault for not taking any action on the recommendations from the task group. Fee noted that their recommendations will be sent to the AASHTO SOM prior to the next ETG meeting.

Recommendation #6 is related to what impact change from #5 has on industry. #6 is also only related to coarse aggregate mixtures. Kevin Hall noted that Rick Harvey already has the red-lined changes to the procedure, so it is ready to go. Harvey would like a written rationale from the ETG on why this should be moved to a ballot.

A major concern is the potential effect related to revision #7. Do not know what impact this will have on industry. Lots of debate and comment on #7; will the criteria related to air voids need to be re-evaluated by changing the way we calculate and measure air voids? A suggestion was that item #7 is an agency decision. Noted an example where an interstate pavement used a coarse mix and Agency used T166. Agency results found that the mixture air voids are 1.6 %, so the comment was that there was too much asphalt in the mix. However, water runs out of the core once it is removed from the water bath. The corelok device found the air voids of the mix were closer to 5%. Maybe the revision might be okay for fine graded mixtures, but may cause concerns with coarse-graded mixtures.

Currently it is believed that most Agencies are just ignoring the parafilm requirement for coarse-graded mixtures. Commented that this is because Agencies want higher densities in those coarse-graded mixtures without changing the criteria or specifications. Another commented, that if you change the way you measure density, you must go back and change the specification. We have to understand what changes are going to make on the final product.

Frank Fee commented that this will be presented in the E-circular and the rationale and recommendations sent to AASHTO.

Frank Fee will work with Rick Harvey to get this item on the ballot. Kevin Hall will provide a one-page summary of what the ETG recommends and provide that to Harvey.

ACTION ITEM (6): Specific Gravity Task Group Report will finalize the E-circular for the TRB web site. The summary the ETG recommendations and the rationale will be forwarded to Rick Harvey for consideration by the AASHTO SOM.

9. Status of NCHRP 9-33 – Ray Bonaquist (AAT)

Ray Bonaquist presented the status and expected completion dates for the publication of the NCHRP 9-33 report and design manual. These are listed below as part of the minutes.

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|-------------------------------------|-----------------|
| 1 – Write commentary | September, 2009 |
| 2 – Convert overheads to PowerPoint | September, 2009 |

3 – Edit manual as per comments	October, 2009
4 – Edit course materials	October, 2009
5 – Edit HMA tools	October, 2009
6 – Compile draft final report	October, 2009

Kevin Hall noted that this is all belongs to NCHRP, but he questioned whether the course materials would be supplied to NHI and where the spreadsheet would end up. Frank Fee noted that this would be similar to other NCHRP projects. Bukowski noted that while the FHWA could use these materials, the course is not an NHI course, and was not put together in accordance with NHI requirements. No action is required for the next meeting under this item.

10. Mixture Conditioning Report, The Florida Study – Frank Fee (NuStar) and Jim Musselman (Florida DOT)

Fee overviewed the Florida aging study relative to what was done. Gerry Huber pointed out an error in slide regarding G_{sb} —it should be G_{mb} . Frank Fee identified and discussed current issues, which are listed below.

Potentially establish a task group to look at short term aging as it relates to mix plant production and consider:

- What is effect on asphalt absorption on durability.
- What is effect on binder stiffness on rutting and thickness.
- What is effect of additives regarding aging similar to WMA and high RAP mixes
- Does the current aging procedure adequately represent what various HMA plants are producing today?

Noted that no procedure will account for all possibilities but should not this be addressed by the mix design procedure. Fee opinion is that there is not a lot of information available on the aging or the effect of aging through plants and how this impacts the mix. Others commented that most of this data is not readily available for many reasons.

Dukatz overviewed testing and evaluation of aging in studies related to WMA and additives and the changes in mix stiffness. The reason why the Florida study looked at only the volumetric properties was that they were interested to use for control or acceptance testing. For a more overall evaluation, will need to look at fundamental properties which will complicate this issue. Commented that maybe anything further should wait until these issues are addressed in the WMA mix design procedure.

Bonaquist overviewed what they were doing on NCHRP WMA design project. He believes that the HMA aging is too high, in other words we are measuring too high modulus values in the lab during mix design. Again it was commented that maybe the ETG should wait until see what is decided in the NCHRP WMA design study and then go back to see what applies to typical HMA. Other members agreed that need to wait on the WMA results; the see if we can determine what we are actually testing in the lab and how those mixtures age in production.

Further noted that there is another project to evaluate how mix properties change between lab designed and plant mixed field placed mixtures. Ellie Hajj noted that project NCHRP 9-48; laboratory versus field measured properties is underway. Nelson Gibson asked; what about field compacted versus lab compacted specimens. ETG had examined different aging times and came up with 4 hours, but the recommendation was solely based on volumetric properties (film thickness, density, etc.). This could change when evaluating properties such as E*.

Frank Fee would like to collect as much information and data as possible on this issue. Reinke asked what is your evaluation tool? Fee opinion commented that important to start collecting the data not necessarily need to be a common evaluation tool at this point.

Ellie Hajj summarized their work on two projects; short term aging in lab was higher than in field on one project and about the same on another project. Ray Bonaquist reported that Ellie Hajj's data has basically doubled the amount of data that is available. Bonaquist agreed that there is a minimal amount of data out there that can be used.

John Bukowski asked whether this should include data on only volumetric properties or also include fundamental property testing data. Fee believed it could include both. Bukowski noted that we have already concluded that the use of volumetric and fundamental properties will probably provide different results and will need different aging criteria. Requested that Fee come back with a more focused statement on what he wants a potential task group to evaluate. Gerald Reinke noted his AAPT paper that addresses the aging issue.

ACTION ITEM (7): Frank Fee will bring to the next ETG meeting a research proposal for evaluating the effects of HMA production on asphalt mixture condition aging.

11. HMA Field Density In-Place Practices and Specification – Erv Dukatz (Mathy Construction)

Cindy LaFluer could not attend the ETG meeting so Erv Dukatz will present the slides that she put together for a status report.

Summary of Presentation:

Erv Dukatz acknowledged the ETG members (Dukatz, Kliewer, Lynn, Musselman, Ryan, Euler [NYDOT], and Callanan Industries).

Agency standard specifications were reviewed in terms of how density is measured. A white paper was prepared and distributed to the ETG on this topic. Dukatz's opinion is that there is a large discrepancy between the agencies density specifications. Potentially this can be as complicated a topic as the previous discussion on aging. The future activities of the task group include (1) investigate the upper limits of density specifications in terms of traffic conditions, (2) add additional data regarding use of the PWL concept for failing lots on the high end, (3) evaluate the AMPT results at the higher in place densities, and (4) validate the standard deviation reported in AASHTO R 42-06 for roadway core densities.

ETG Comments, Questions, and Discussion:

Frank Fee questioned whether the white paper had yet to be distributed. Dukatz replied that it was submitted with the presentation. For the next meeting, the task group will summarize what the agencies are doing on density specifications

ACTION ITEM (8): The Construction Task Group (LaFluer (Lead), Dukatz, Kliever, Lynn, Musselman, and Ryan) is requested to present at the next meeting a recommendation for a possible TRB synthesis on the measurement and acceptance of asphalt pavement density.

12. Hot-Mix Asphalt Longitudinal Joint Construction; National Survey Results – Tom Harman (FHWA)

Summary of Presentation:

Tom Harman provided a brief review and background of this topic. Many agencies have reported that they were starting to exhibit more longitudinal joint problems than they have in the past, thus the reason for this survey.

Harman overviewed the challenge on this topic. Three items were presented to the ETG: (1) Sound construction practices play a key role in performance, (2) HMA longitudinal joints are often the first failure point when not well constructed, and (3) longer lasting HMA joints result in lower life cycle costs, improved safety, and increased service life.

Harman then overviewed the survey and the comments and responses that were returned. Harman also included a summary and listing of other criteria being specified by Agencies. He also summarized those items that Agencies are looking to change within their specifications and evaluation of their current practices.

Main issue, do we have a need for research in this area? Harman's suggested we know how to build good joints. FHWA has set up a cooperative agreement with the Asphalt Institute to provide better communication of existing practices. This is more of a marketing effort regarding longitudinal joint construction.

ETG Comments, Questions, and Discussion:

Fee asked whether this has been shared with the AASHTO subcommittee on construction. Harman replied not yet. Noted that a lack of specifications or training with the people actually building the pavement. Harman responded this is a two part process; what is the best way to specify the process and how to ensure that it has been done correctly.

No action item required from this topic presentation and discussion.

Meeting adjourned for day at 4:45PM.

DAY 2 – Tuesday, September 15, 2009

13. Status of NCHRP 9-26 – Haleh Azari (AMRL)

Presentation Title: *Status of NCHRP 9-26*

Project Title: Interlaboratory Studies and Data Mining to Collect Data for the Preparation of Precision Statements.

Summary of Presentation:

Azari overviewed the project and its status. Many different materials are included in the study for determining precision data. The scope of the project has changed over time for preparing precision statements. Azari briefly discussed some of the ongoing and future projects that they are participating in or conducting at ARML under NCHRP 9-26. These included:

1. Determining appropriate conditioning time for performance testing of asphalt mixtures with absorptive aggregate to determine the effect of conditioning time of stiffening of the mastic and mechanical properties of mixtures with absorptive aggregates.
2. The effect of replacing mercury-in-glass measuring devices in AASHTO test methods to investigate the effect of using alternate temperature and pressure measuring devices on the precision and accuracy of the test methods using mercury devices.
3. Ruggedness study of AASHTO T 312. Azari is doing a literature review and then will prepare an experimental plan to determine the effect on G_{mb} measurements. In other words, an experimental plan to evaluate the factors that could have an effect on the test results.
4. Testing related to Mix ETG initiative on specification criterion for rutting using the Flow Number test and ruggedness study for measuring E^* using the indirect tensile test and the ruggedness study for measuring E^* with the IDT has yet to begin.
5. Evaluation of mechanical agitators for measuring G_{mm} .
6. Precision and bias study for the Hamburg test (AASHTO T 324).
7. Precision and bias study for the multiple Stress Creep and Recovery (MSCR) test (AASHTO TP 70)
8. Development of a database for long-term storage of field data from projects built with WMA and high RAP content mixes, modified mixes, etc.

Most of the necessary test equipment is available through the NES laboratories. Azari overviewed the tests that are being utilized in the conditioning and other studies. Haleh asked for any input and comment on the different tests and data being used within 9-26 study.

ETG Comments, Questions, and Discussion:

Kevin Hall asked what is being looking at for the ruggedness testing of AASHTO T 312. Azari replied that ARML will look at the corelok and other elements. Hall asked are you looking at different gyrator compactors within the plan. Azari replied that they were planning to use different compactors. Rick Harvey noted that Wisconsin was doing a similar study and asked if

that study had been reviewed in planning the NCHRP 9-26 work. Azari agreed to look into that project.

No formal action item was required from this topic presentation and discussion.

14. Bending Beam Rheometer & Semi-Circular Bend (SCB) Mixture Testing – Mihia Marasteanu (University of Minnesota)

Mihia Marasteanu noted that he has not completed the work on the semi-circular bend mix test, and would wait to the next meeting to present the results of that effort. Marasteanu noted that he will focus on the BBR test to obtain the creep compliance properties; he will provide an update on this related to low temperature testing. Marasteanu acknowledged that Bill Buttlar (University of Illinois) is involved in this testing, and provided two documents during the presentation that are available with his presentation. These two documents were:

1. Draft standard method of test for determining the flexural creep stiffness of asphalt mixtures using the bending beam rheometer (BBR).
2. Edited draft standard method of test for determining the fracture energy of asphalt mixtures using the semi-circular bend geometry (SCB).

Summary of Presentation:

The test method describes you how to prepare and test specimens, but does not tell you how to determine the critical temperature related to low temperature cracking. This is the topic summarized during the presentation. Marasteanu's group has been working on this over the past couple of years, and only focused on the low temperature properties that control the thermal cracking. Marasteanu opinion is that the BBR test can provide the properties needed for low temperature cracking. The effect of large aggregates is significantly reduced.

Marasteanu has developed a sample preparation and loading procedure for measuring properties. They are working with Cannon Instruments for developing the equipment (preparing and testing the specimens). Marasteanu opinion is that the IDT equipment and test can be replaced with the BBR equipment in terms of low temperature properties. No significant difference in test results between testing IDT and BBR test specimens. Their assumption is that the IDT does provide good or correct low temperature properties. They have checked the effect of beam size on the results and found that the smaller beams did provide similar properties to the larger beams that were prepared and tested. The draft test method has been developed and Marasteanu overviewed it during the presentation. Marasteanu requested input and comments from the ETG members and friends.

Determining the Flexural Creep Stiffness of Asphalt Mixtures Using the Bending Beam Rheometer (BBR) – this provided draft procedure is an example only, which was not for general distribution. The precision and bias of the test method has yet to be developed, because one piece of equipment was only used so far. Marasteanu overviewed details of the sample preparation and test procedure, as well as other parts of the proposed test standard. Marasteanu also summarized

how the test results are interpreted for determining the mixture properties. The calculations are basically the same as for the BBR binder tests. This information was provided in the proposed test standard.

ETG Comments, Questions, and Discussion:

It was asked whether any comparisons between the testing of the binder and mixture using this test methods been completed? Marasteanu answered that many different binders have been used, but not over a large range in aggregate size. The data looked consistent between the binders and mixtures. Marasteanu commented that there is a direct correlation between binder and mixture for compliance and strength. He also used the IDT strength test and compared those results to the BBR test results. The BBR strength test values are higher and some cannot be reproduced with the IDT. Marasteanu also maintained that the m-values for different binders and mixture using this test method are related.

Raj Dongre commented that when you are doing your stress controlled test, you are using different strain rates and you have to be careful in comparing different test results or properties to predict thermal cracking. Marasteanu agreed.

Gerald Reinke asked about aging, what procedures were used? Marasteanu commented that there is a protocol available. Reinke noted his concern that the extracted binder from field aged mixes does not look like the binder aged through the PAV. This relates to the shift factor between the binder and mixture of lab versus field. Marasteanu refereed to the work they did on using PAV and believes that the PAV is not really representative of field aging. This question has not been answered and needs to be evaluated.

Asked whether another type of device will be needed for the mixtures and should that be a more robust machine in comparison to the binders. Opinion is that there needs to be more practical considerations about using the BBR for testing mixtures. Marasteanu agreed with comment. Raj Dongre opinion is to use the existing BBR to maintain the simplicity of the device. Using different machines, introduces new equipment compliance issues. Dongre commented that fracture tests are highly variable, much more than distortion tests. That does not mean that the tests are bad, only the variability is high.

Frank Fee comment; unless you find a useful purpose of the test method, then it is just an exercise. Marasteanu; this is a more direct way or method to determine the mix strength and creep compliance as inputs to the MEPDG. Ray Bonaquist opinion; one useful technique of this device today is for evaluating high RAP mixtures. The test method is directly applicable to HMA but should be extended to the intermediate and high temperature ranges. Frank Fee commented that you need to provide some guidance on how test method can be used for specification development. Marasteanu was just looking at developing the test right now, but will consider that comment in further work.

Erv Dukatz asked whether Marasteanu has looked at using the device for testing the MnRoads mixtures that have been down a long time to evaluate their properties. Marasteanu commented that the test has been used to evaluate changing mix properties with depth from MnRoads.

Variability was large but you definitely saw a difference in properties between the top and bottom and new versus aged mixtures. So far most of the work has been focused on comparing the BBR to IDT properties and test results. One of the issues with other methods is that when you extract the binder you do age the binder and change the properties, however, it would appear that with this device you eliminate that issue or problem.

Frank Fee encouraged Marasteanu to set up a round robin program to start getting data from multiple laboratories. Marasteanu agreed to keep the ETG informed of these activities.

ACTION ITEM (9): Marasteanu will prepare a proposal for the BBR procedure and distribute to the ETG for comments. Any comments need to be returned to Mihai Marasteanu before the next meeting.

15. Mixture Sliver Fatigue Testing Results – Raj Dongre – ESC, Inc.

Summary of Presentation:

Raj Dongre acknowledged all involved in this work (John D'Angelo, Satish Belagutti, David Heidler, and Darnell Jackson). Dongre noted that he will present something similar to what Mihai Marasteanu just presented but using much larger test specimens. His focus is how polymers affect the fatigue properties of HMA mixtures.

He overviewed how the test specimens were developed and prepared. The gluing can have a huge impact on the test results. Dongre also overviewed the testing conditions that were used to measure the mix properties. The fracture properties are measured in shear through the DSR – rotational movement. The bond between the platens and specimen must be stronger than the specimen. They were initially using a fast set epoxy as the glue, but that was later changed to the liquid steel bond. The type of glue did make a large difference in the fatigue test results. The disadvantage of the liquid steel bond is the amount of time needed for the glue to set. Dongre presented a summary of the fatigue test data from this test. A summary of additional observations from his data:

- Bonding of samples affects test results.
- Glue must be stiffer than mixture.
- High variability.
- Sliver location is critical to get good results (sliver must be close to center).
- SBS improved fatigue response for both 2 and 4% levels; the 3% SBS level produced erratic results.
- Specific binder using 2 and 4% SBS provided equivalent mix fatigue results.

ETG Comments, Questions, and Discussion:

Gerry Huber commented that this looks like you have two parts, development of the test and the defining the most representative test procedure. D'Angelo commented that there was no development of the test procedure, they just accepted and used a procedure developed from TTI.

D'Angelo also noted that the purpose of the procedure here was only to rank the mixtures in terms of the fatigue properties; this was not the development of a new test method.

Gerald Reinke commented regarding the evolution of this test method. If you are interested in the mix fatigue properties, coring is an important issue when looking at the mix fatigue properties. If you cast the cylinder with the minus #4 material, then you get better results. Reinke recommended looking at the sand cylinder approach for the mix testing. Dongre agreed with that point on the binder, and explained how the samples were prepared; no large aggregate was used to prepare the samples, so coring was not a big issue.

John D'Angelo commented that this should be considered a binder study, not a mix testing study. His opinion is that there is currently no good binder fatigue test. This testing was done just to start looking at the effect or importance of the amount of polymer and the results demonstrate that the amount of polymer is important. The amount, however, does not always make a significant difference and validates some of the results from the ALF.

In any fatigue testing the results are dependent on the stiffness of the mixture. Some of the shift or difference can be a result of stiffness differences rather than a true material difference. This effect is not related to how much polymer has been used; modified versus neat mixtures.

No formal action item was required from this topic presentation and discussion.

16. *Utah DOT Evaluation of Using the BBR for Mixture Testing:* Pedro Romero (University of Utah) and Kevin Van Frank (Utah DOT)

Kevin Van Frank started with introducing the subject and topic for discussion. He noted what lead into using the procedure that Mihia Marasteanu was using to increase the size of the beam and testing it with a larger piece of equipment. Based on the initial test results it appeared that the scaled down version that Marasteanu was suggesting did provide reasonable results. The initial results were presented to the ETG meeting at the last meeting. This presentation will provide additional data and test results on this topic. Pedro Romero gave the presentation.

Summary of Presentation:

Pedro Romero acknowledged all who participated within this study and where the project came from (Chun-Hsing Ho and Crystal Clendennen). Romero introduced the project and the issue at hand regarding mix testing for low temperature property characterization – which is limited. One question; can we use BBR to test mixes? To procure mixtures of the same type, they used a trial and error process for varying the VMA (gradation) and binder content to result in the same air void level and VFA. VFA and air voids were used to determine that the mixture or reduced sample size was equivalent.

A graph illustrated a significant effect of air voids on stiffness. Conclusion from study was that you can determine the properties of HMA mixtures from the use of small specimens. Results also indicate that the BBR can be used to determine reasonable properties for HMA mixtures at low temperatures. From those results or findings Romero asked the ETG for advice on how to

proceed – develop master curves for performance prediction, develop limits for specifications, or use the results for quality control.

ETG Discussion, Comments, and Questions:

Sang Soo Kim; was there some reason that you did not use an ANOVA to isolate the effect of different parameters. Romero responded, no because the analysis has yet to be completed. It is expected that they will use a two-way ANOVA.

No formal action item was required from this topic presentation and discussion.

17. Next Meeting Location and Date

Chairman Fee reported that the next meeting scheduled for week of February 22 in Irvine, CA. The exact dates will be coordinated with the other ETG meetings.

18. Overview of Action Items

Secretary John Bukowski overviewed the action items from the meeting, which are:

1. AASHTO Status Update: TP 79, Determining the Dynamic Modulus and Flow Number for HMA Using the AMPT:
 - a. Ed Harrigan will be asked provide the ETG a copy of the AMPT equipment specification developed under NCHRP 9-29.
 - b. Ray Bonaquist will provide a write up on what is actually required for calibration.
2. SGC Mold Wear Task Group members, Erv Dukatz, Kevin Hall, and Roger Pyle will prepare a brief summary explaining the methodology/rationale being proposed as an Annex to the standard. The Annex to T 312 and summary will be forwarded to Rick Harvey for consideration by the AASHTO Subcommittee on Materials.
3. Ray Bonaquist with assistance of the AMPT Task Group (Von Quintus, Kim, Van Frank, Blakenship, Tran, Reinke, Huber, Copeland and Dongre) will develop a work plan on parameters needed to perform “flow number” testing and the gathering of output data. The work plan will be distributed to the ETG members and discussed at the next ETG.
4. Richard Kim will prepare a written ruggedness plan for using the IDT to measure E* and provide to the ETG for comment. He will provide a presentation to the ETG to explain the factors included in the experimental ruggedness plan.
5. Gyrotory Commentary Task Group (Fee, D’Angelo, Huber, West, Prowell, Hall, and Julie Kliever) will develop a “stand-alone” summary/commentary document on approaches and impact for lowering N-design.
6. Specific Gravity Task Group Report will finalize the E-circular for the TRB web site. The summary the ETG recommendations and the rationale will be forwarded to Rick Harvey for consideration by the AASHTO SOM.

7. Frank Fee will bring to the next ETG meeting a research proposal for evaluating the effects of HMA production on asphalt mixture condition aging.
8. The Construction Task Group (LaFluer (Lead), Dukatz, Kliewer, Lynn, Musselman, and Ryan) is requested to present at the next meeting a recommendation for a possible TRB synthesis on the measurement and acceptance of asphalt pavement density.
9. Mihai Marasteanu will prepare a proposal for BBR procedures and distribute to the ETG for comments. Any comments need to be returned to Mihai Marasteanu before the next meeting.

19. Meeting Adjournment

Secretary John Bukowski and Chairman Frank Fee thanked everyone for attending the meeting and thanked NuStar for hosting the ETG meeting. Fee adjourned the meeting at 11:25 AM.

ATTACHMENT A

FHWA Asphalt Mixture & Construction ETG Meeting Agenda San Antonio, Texas September 14 & 15, 2009 Meeting Agenda

Day 1— September 14, 2009

8:00 am	Welcome and Introductions	Fee
8:15 am	Review Agenda/Minutes Approval & Action Items February, 2009 Meeting	Bukowski
8:30 am	Subcommittee on Materials Updates/Comments	Harvey
9:00 am	Procedure to Measure the SGC Mold Wear	Musselman/Dukatz
10:00 am	Break	
10:15 am	AMPT Flow Number Testing Task Group Status Report	Bonaquist
11:15 am	Report on IDT E* Ruggedness Testing Plan	Kim
12:00 noon	Lunch	
1:00 pm	Mix Testing Recommendations for Lower N_{design} Values	D'Angelo
1:45 pm	Specific Gravity Task Group Report	West
2:30 pm	Break	
2:45 pm	Mixture Conditioning Report – Florida Study	Musselman
3:15 pm	State Survey Short Term Mix Aging	Azari
3:45 pm	Construction Issues White Paper	LaFleur
4:15 pm	Survey of Longitudinal Joint Specifications/Practices	Harman
	Adjourn for the Day	

Day 2— September 15, 2009

8:00 am	Status of NCHRP 9-33	Christensen
9:00 am	BRR & Semi-circular Bend (SCB) Mixture Testing	Marasteanu
9:30 am	Mixture Sliver Fatigue Testing Results	Dongre
10:00 am	Break	
10:30 am	Utah DOT -Sample Size for Testing Mix SG	Van Frank
11:00 am	Asphalt Research Consortium Work Plan and ETG Participation	ARC Representative
	Action Items and Next Meeting Planning	Bukowski
	Adjourn	

ATTACHMENT B

FHWA Asphalt Mixture & Construction Expert Task Group Members

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ATTACHMENT C

Task Group Members and Assignments FHWA Asphalt Mixture & Construction ETG

Task Group Identification:		Members Assigned to Group:
1	Gyration Level Commentary	John D'Angelo (Lead); Gerry Huber, Brian Prowell, Randy West, Frank Fee, Kevin Hall, Julie Kliewer
2	E-Circular Preparation	Gyratory Compactor Ray Bonaquist (Lead); Randy West, Erv Dukatz, Frank Fee, Adam Hand, Jim Musselman
3	E-Circular Preparation	Specific Gravity Ray Bonaquist (Lead); John D'Angelo, Adam Hand, Julie Ryan, Shane Buchanan
4	Specific Gravity	Randy West (Lead); Erv Dukatz, Nelson Gibson, Kevin Hall, Chuck Marek, Jim Musselman, Julie Kliewer, Roger Pyle
5	Guidance for Flow Number Testing	Ray Bonaquist (Lead); Richard Kim, Ellie Hajj, Haleh Azari, Audrey Copeland, Kevin Van Frank, Phil Blankenship, Nam Tran, Raj Dongre, Nelson, Gibson, Harold Von Quintus
6	HMA In Place Density Practices & Specifications	Cindy LaFluer (Lead); Erv Dukatz, Julie Kliewer, Todd Lynn, Jim Musselman, Judy Ryan, Chris Euler