Appendix A – Summary of Questions, Comments, and Open Discussions

Question: What's the reason of measuring/reporting volumetric properties for BMD approach 3 – performance design?
Answer: (1) To provide mix designers with increased confidence level by using volumetrics properties as a final check for mix quality; and (2) to allow contractors and agencies to use volumetrics for production quality control and acceptance testing. However, NCAT feels that eventually some type of mix performance testing should replace the use of volumetric properties in Quality Assurance programs.

Question: Was the IDEAL-CT test included in the NCHRP project 20-07 survey?
Answer: No, the test was still under development when the survey was conducted in 2017. The test, however, was discussed in detail in the project final report (a copy was provided in the thumb drive).

Question: Why use 150-mm tall samples for AMPT flow number and cyclic fatigue tests?
Answer: To avoid edge effects and to ensure the sample has a representative volume element for the tests.

Question: Are there any correlation between AMPT cyclic fatigue and surrogate cracking performance tests?
Answer: NCAT is not aware of any completed research studies that evaluated the correlation between AMPT cyclic fatigue versus IDEAL-CT/N_{flex} Factor/Cantabro test results. However, both cyclic fatigue and IDEAL-CT are included in the ongoing NCAT Cracking Group study. We will look into their relationship once the results become available in Spring 2020.

Question: When will the NCAT-MnROAD Cracking Group study be completed?
Answer: The NCAT Test Track study started in August 2015. The first trafficking cycle (10 million ESALs) ended in 2018, with only few cracks observed in sections N1 (20% RAP control mix), N2 (same as N1, but higher in-place density), N5 (same as N1, but lower AC and in-place density), and N8 (20% RAP plus 5% RAS mix). The sponsors decided to continue trafficking the sections for another 10 million ESALs. All laboratory testing has already been completed. The field cracking data will be finalized by Fall 2020.

Question: For the proposed BMD approach B (volumetric design with performance optimization) and D (performance design), how is the optimum binder content selected if there are two or more contents passing the performance test requirements?
Answer: There are several methods available: (1) using the minimum, (2) using the average of maximum and minimum, (3) using the minimum plus an agency specified production tolerance (e.g., 0.3% or 0.4%). If not considering the production tolerance in selecting the optimum binder content, there is a risk that the production mix could become "unbalanced" in terms of rutting

or cracking resistance. This is one of the reasons why performance testing is needed during plant production.

Question: Has any research been done to study the use of cushion layer (e.g., OGFC or crushed stone base) or stress/strain relieving interlayer [e.g., chip seal, stress absorbing membrane interlayer (SAMI)] to mitigate reflective cracking?
Answer: Yes, a good refence on this topic is a study by Applied Research Associates, Inc., entitled *Techniques for Mitigation of Reflective Cracks,* at http://www.eng.auburn.edu/research/centers/ncat/files/aaptp/Report.TechnicalGuide.05-04.pdf. The use of cushion layer or stress/strain relieving interlay can delay, but not necessarily prevent, the reflection of existing cracks or joints on underlying existing pavements.

Question: Are there any concerns for I-FIT and IDEAL-CT tests showing incorrect sensitivity to specimen air voids?
Answer: Yes, this is one of the limitations of cracking test methods using the post-peak slope as part of the cracking parameter. NCAT's experience shows that the cracking parameters [e.g., Flexibility Index (FI) or Cracking Tolerance Index (CT_{index})] are much more sensitive to the post-peak stress-strain slope than the fracture energy; as a result, the results tend to improve when samples have a more gradual post- peak slope, such as samples with higher air voids. Conversely, the cracking parameters decrease for mixes with steeper slopes as is the case with samples with low air voids.

Additional commentary: I-FIT and IDEAL-CT results show a counterintuitive trend on the impact of density (or air voids) on the cracking resistance of asphalt mixtures. Several field performance studies have shown that asphalt pavements with higher in-place density (or, lower air voids) have better cracking performance than those with lower in-place density (or, higher air voids). However, both I-FIT and IDEAL-CT tend to yield more favorable results for specimens with higher air voids. Although a density correction factor has been developed for I-FIT, it was developed based on a limited number of asphalt mixtures in Illinois and may not work for mixtures with different components and proportions. Therefore, it is very important to maintain a consistent range of air voids (target ± 0.5%) for I-FIT and IDEAL-CT specimens when using these two tests to assess the cracking resistance of asphalt mixtures.

Additional commentary: Testing field cores for acceptance has the merit of eliminating the fabrication of gyratory samples, and therefore, could shorten the turnaround time on test results. However, it also has limitations of not having consistent sample thickness and air voids among field cores, which have been found to have a significant impact on the cracking test results.

Question: How should mixture aging be handled during production testing?
Answer: Currently, there is no consensus on this question among stakeholders. NCAT proposes two potential approaches:

- The first approach requires conducting the selected cracking test(s) on both unaged and critically aged lab-produced mixes during mix design to establish a mixture aging adjustment factor. The mix design will be approved if the critically aged result (e.g., a CT_{index} of 40) passes the agency specified performance criterion (e.g., minimum CT_{index} of 35), and the unaged result (e.g., a CT_{index} of 70) is then used as the production target. During production, contractors and agencies would test hot-compacted samples for expediency and compare those results to the value from the unaged lab mix (production target). When using this approach, no changes in mix components (e.g., binder source, binder graded, rejuvenators, etc.) would be permitted, because that could affect the aging adjustment factor, which is mix specific.
- The second approach requires a field verification lot where plant mix is sampled and tested at three aging conditions: hot-compacted (without mix reheating), reheated, and critically aged.
    - If the critically aged test result (e.g., a CT_{index} of 40) meets the agency specified performance criterion (e.g., minimum CT_{index} of 35), the verification lot is approved, and full production can start. At this point, the hot-compacted result (e.g., a CT_{index} of 70) becomes the target for remainder of mix production. Contractors and agencies would only test hot-compacted samples for expediency and compare the results to the value of the hot-compacted sample from the verification lot.
    - If the critically aged test result (e.g., a CT_{index} of 28) does not meet the performance criterion (e.g., minimum CT_{index} of 35), contractors are required to adjust the plant settings and repeat the field verification process until the verification lot is approved.
    - The reheated sample tests are needed when the agency does not hot-compact samples for Quality Assurance testing including acceptance testing, verification testing, and dispute resolution testing. More research is needed on the differences in test results for mixtures tested unaged, after reheating, and critical- or long-term aging.
    - For this approach, agencies may require additional verification lots during production (e.g., every 10,000 tons) to ensure all mixes remain “balanced” with satisfactory cracking resistance.
- It is also noted that NCHRP project 09-54 (North Carolina State University) has been researching how to integrate a long-term oxidative aging model in the pavement performance prediction program, FlexPAVE™.

Additional commentary: From a binder supplier perspective, it will be difficult to ask contractors to keep the same binder source from mix design to production because they have no control on the crude source and refinery process used.

Additional commentary: Maryland, Pennsylvania, and West Virginia reported requiring a design verification LOT prior to actual production.

Question: For the BMD Performance Design approach, how should an agency assess the production quality?
Answer: Since this approach does not require volumetrics analyses for mix design, quality assurance testing should be based on performance testing of plant-produced mixes. In cases where the mix design performance tests cannot be used during production due to the long specimen preparation and testing time, surrogate performance tests that are simpler, faster, and have shorter turnaround time on test results could be used. In these cases, the mix-specific correlation between mix design and surrogate performance test results should be verified during mix design. Alternatively, quality assurance testing could be based on the measurements of asphalt content and aggregate gradation. However, this alternative approach cannot fully ensure that the plant-produced mixes have "balanced" rutting and cracking performance.

Question: How many plant QC labs have the capability of running the Cantabro and IDEAL-CT tests?
Answer: Most contractor QC labs typically do not have an LA abrasion machine for Cantabro testing, except for those co-located with an aggregate quarry. For the IDEAL-CT test, most contractor QC labs have a Marshall press that is used for routine TSR testing. NCAT has been conducting an in-house experiment to investigate the feasibility of using a Marshall press for IDEAL-CT testing. Although the preliminary results look promising, the Marshall press does have an issue of not being able to accurately control a constant displacement rate of 50 mm/min. Please contact NCAT for additional information about the "Marshall press" experiment if interested.

Question: What are the potential "surrogate" rutting tests for production testing?
Answer: (1) High-temperature indirect tensile strength test, proposed by Don Christensen and Ray Bonaquist at Advanced Asphalt Technologies, LLC. (TRB E-C124, 2007); (2) High-temperature compact shear test, proposed by Fujie Zhou at Texas Transportation Institute (AAPT, 2019).

Question: Could the boiling water test be used as surrogate test to TSR?
Answer: This is worth looking into. NCAT is not aware of any published research that investigated the correlation between the results of these two tests. A few state agencies (including Pennsylvania and Maryland) do require contractors to conduct both water boiling and TSR tests when a change in binder source is made.

Question: Is it a good practice for an agency to adopt a test criterion proposed by a neighboring state?
Answer: Although it can be done this way, a better approach is to benchmark existing mix designs in the state and evaluate the distribution (e.g., average, standard deviation, etc.) of the

performance results. This is how Virginia DOT developed their preliminary BMD performance criteria.

Question: Is lab-molded air voids still important for mixes designed using a BMD approach?
Answer: Currently, there is no consensus on this question among stakeholders. There are three new BMD sections on the Test Track that had low lab-molded air voids (2% to 2.5%) on plant-produced samples, but they all passed the preliminary performance test requirements. We will monitor how they perform in the field up to 10 million ESALs.

Question: How are states adjusting volumetric tolerances for BMD?
Answer: It varies from state to state. Some agencies are following the "volumetric design with performance verification" approach, where the mix design is required to meet both current volumetric requirements and additional performance criteria. Other agencies may use the "volumetric design with performance optimization" or "performance-modified volumetric design" approach, where some of the volumetric requirements can be relaxed or eliminated provided that the design passes the performance criteria.

Question: What's the typical level of variability for measuring G_{sb} of RAP aggregates?
Answer: In short, the answer is we don't know. There are a number of approaches used for determining or estimating the G_{sb} of RAP aggregates; each approach likely has unique test method variabilities and biases. In addition to testing variabilities, it is also possible that RAP materials at a given plant would also have greater materials variabilities over time than virgin aggregate materials. For further guidance on this topic, NCAT recommends reading NAPA QIP 129, *Best Practices for RAP and RAS Management*, which is available for free download at the NAP website: http://www.asphaltpavement.org

Question: Has any research been done to investigate the use of the dry IDT data (as part of TSR test) for IDEAL-CT calculation?
Answer: NCAT is working on a research project for the Alabama DOT on this topic. Mix design and production TSR data from historical projects have been requested and will be analyzed in the next few months. It should be noted that TSR and IDEAL-CT tests require testing specimens with different dimensions. Although a thickness correction factor has been built into the calculation of CT_{index} parameter, its validity and accuracy still need further verification.

Question: When using performance tests for quality assurance, what's the typical turnaround time on test results?
Answer: When performance tests requiring no sample cutting, notching, or gluing (e.g., IDEAL-CT, HT-IDT, Cantabro, etc.) are used, the fastest possible turnaround time from sampling the mix to getting test results is approximately 3.5 to 4 hours if no additional laboratory mix aging is used.

Question: Does NCAT have any recommendations on where plant mixes should be sampled for performance testing (e.g., from the truck, behind the paver, from the 'shuttle buggy')? Would that possibly affect the performance test results due to mix reheating?
Answer: This is a big issue that involves several different concerns. The first concern is always safety, in particular the safety of the personnel taking the samples. When taking a sample out of the back of the truck, it is essential that good sampling stands are provided, and personnel do not get into the bed of a truck to sample mix. When sampling from a roadway, there are additional safety issues since the sampler has to enter the work zone between the paver and the breakdown roller. For night-time paving, there are additional dangers due to limited visibility. Another issue is the quality of the sample. Perhaps there is a greater possibility of getting a segregated (i.e. non-representative) sample from the back of the truck, but that can be minimized with proper training. Although it is possible to get a segregated sample from behind the paver, that sample would be representative of the finished product and the contractor would appropriately suffer the consequences. Also related to the quality of the sample is the effect of having to reheat the mixture to the compaction temperature. This is a greater concern for mixes sampled at the paving site and transported back to a lab due to the longer time lag between sampling and specimen fabrication. The effect of reheating mixes for volumetric properties was inconsequential in most cases. However, the effect of reheating on cracking test results may not be insignificant for some mixes. NCAT has an internal procedure for mix reheating, but our data is limited at this time on how it affects performance test results compared to results for samples compacted hot right out of the plant. Lastly, the concern for testing timeliness must also be factored into the decision on where to take the samples. For this issue, sampling from the truck has a clear advantage. Sampling from the roadway can delay the results significantly. There are three parts to that delay. First, the mix has to be hauled to the paving site and put through the paving operation. Second, the sample has to be transported to a laboratory and that time can be several hours in some cases. Third, once the sample arrives at the laboratory, it has to be reheated to a compaction temperature, which can also take a couple of hours.

It is likely that sampling location has been debated in the past in most states. It should be part of the discussion again as each state considers how to implement mix performance tests within its Quality Assurance program. There are many different ways that state DOTs handle acceptance testing. Many states use contractor data with periodic verification testing by the DOT (or consultants); some states conduct all of the acceptance testing at contractors' labs, some use consultant labs for acceptance testing, and others conduct those tests at district or regional labs. Getting representative samples in a safe and timely manner for assessing should be factors in future decisions about changes made to QA programs.

Question: Is BMD applicable to asphalt thinlay mixes?
Answer: In general, yes. NCAT believes that performance testing should be applicable to most mix types. One exception that comes to mind is ultrathin bonded wearing courses. This mix type is essentially a gap-graded mix typically placed less than one inch thick with a spray-paver using a polymer-modified tack coat. Its purpose is generally to improve safety and smoothness. For

some dense-graded thinlay mixes, such as 4.75 mm NMAS mixes, the air void content of the test specimens should target the expected air voids for the mat, which it typically around 10 percent. Also keep in mind that the performance tests and criteria should depend on the applications and climate. For example, a reflection cracking test should be used to design and verify the mix intended for an AC-over-PCC composite overlay project, while a thermal cracking test is needed for projects in the northern states. Additionally, even for the same type of application project, high-traffic-volume roadways should require stricter performance criteria than low-traffic-volume roadways.

Question: Will the use of PMA binder affect the optimum asphalt content for mix design?
Answer: For volumetric mix designs, switching from an unmodified binder to a PMA binder is not likely to have an impact on the optimum asphalt content or mix volumetric properties provided that the mix production temperature is adjusted accordingly to account for the higher viscosity of PMA binder. However, the use of PMA could result in a significantly different mix design for BMD. Existing literature have showed that asphalt mixtures containing PMA binders have significantly better rutting resistance, and in many cases, improved cracking resistance than those containing unmodified binders. Therefore, the optimum asphalt content of an existing mix design may need to be adjusted (or at least verified) when a PMA binder is used for BMD.

Question: Is there a correlation between aggregate NMAS and mix rutting performance?
Answer: In some regions of the country, there is or has been a prevalent assumption that larger NMAS mixes are more rut resistant than smaller NMAS mixtures. For example some people believe that 12.5 mm NMAS mixes are inherently more rut resistant than 9.5 mm NMAS mixes. NCAT conducted one experiment on this issue during the first cycle of the Test Track and found that a 9.5 mm NMAS mix and a 12.5 NMAS mix produced with the same aggregate stockpiles and binder had essentially the same rutting performance with about 0.1 inches of rutting after 10 million ESALs. One potential advantage of a BMD approach would be that the selection of NMAS could be at discretion of the mix designer considering other constraints such as layer thickness and friction.

Question: What is the recommended long-term aging protocol for I-FIT?
Answer: Starting at 2021, the Illinois DOT will be requiring the aging of notched SCB specimens for 3 days at 95°C for I-FIT. Other alternative long-term aging protocols used in existing research studies include loose mix aging for 6 to 8 hours at 135°C (NCAT/MnROAD Cracking Group Experiments) and loose mix aging for 3 to 5 days at 95°C (NCHRP 9-54 project); both protocols were expected to simulate approximately 3 to 5 years of field aging in most continental United States.

Question: Do PMA binders provide better cracking performance than unmodified binders?
Answer: In some cases, yes, but not always. The Asphalt Institute document IS-215 summarizes a study conducted by the Applied Research Associates, Inc. to quantify the effects of PMA for reducing pavement distresses using the Long-Term Pavement Performance (LTPP) and non-LTPP

test sections. The study concluded that use of PMA binders significantly improved the rutting and cracking performance of asphalt pavements based on field performance data monitoring and pavement M-E design analyses. NCAT's experience on the Test Track indicated that PMA modified mixtures always outperformed the unmodified mixtures in terms of rutting resistance; but there was no consistent trend for the impact of PMA on pavement cracking performance. Some recent laboratory studies also found that asphalt mixtures containing PMA binders (especially those with higher PG) had lower I-FIT and IDEAL-CT results compared to the same mix designs with unmodified binders.

Question: What are the commonly used long-term aging protocols for mixture cracking tests?
Answer: The standard practice for laboratory long-term oven aging (LTOA) per AASHTO R 30 is to condition a compacted specimen for five days at 85°C. This protocol was initially developed in a pre-SHRP study and was proposed to simulate field aging of asphalt pavements over seven to ten years of service. However, NCHRP project 09-52 found that this protocol was only representative of approximately one or two years of field aging in warmer climates and colder climates, respectively. The conclusion was obtained based on the resilient modulus (M_R) and Hamburg wheel tracking test (HWTT) results of LMLC specimens and field cores for over 40 different asphalt mixtures. Similar findings were also reported by Islam et al. (2015) and Howard and Doyle (2015) using bending beam fatigue (BBF) and Cantabro tests, respectively.

As an alternative to conditioning compacted specimens, LTOA can be conducted by aging asphalt loose mix prior to compaction. Loose mix aging typically yields a more severe level of binder aging due to increased exposure of the binder film to oxygen and elevated temperature. The loose mix aging process can be further accelerated using a higher temperature without concerns of specimen distortion (i.e., changes in specimen air voids and geometry). NCHRP project 9-54 has recommended loose mix aging at 95°C for a period of time based on climate, depth, and years of service. For surface layers with four years of service, aging time using this protocol ranges from 72 to 120 hours for most of the continental U.S. A series of lab-versus-field aging correlation maps were developed upon completion of the project.

Another commonly used LTOA protocol is loose mix aging at 135°C. As compared to the 95°C aging protocol, the 135°C protocol requires a shorter period of time to achieve the same level of asphalt aging, and thus, is more practical for potential implementation into routine mix design. The ongoing NCAT/MnROAD cracking group experiments have been using loose mix aging for 6 and 8 hours at 135°C for the evaluation of mixture thermal cracking and top-down cracking, respectively. Similar aging protocols have also been used by Braham et al. (2009) and Reinke et al. (2015). However, it is worth noting that chemical changes may occur in certain asphalt binders at aging temperatures above 100°C due to disruption of polar molecular associations and sulfoxide decomposition.

Additional commentary: The aging protocols are different for the Louisiana SCB method and the Illinois method (IFIT). The SCB-LTRC method (ASTM D8044) requires the long-term aging protocol per AASHTO R 30 (5 days at 85°C on compacted specimens). The I-FIT procedure (AASHTO TP

124) does not address aging, but the Illinois DOT requires aging cut and notched IFIT specimens for 3 days at 95°C prior to testing.

Question: Can HWTT be tested on field cores of thinlay mixes?
Answer: Yes. For thinlay mixes, field cores can tested by leaving the thinlay on the underlying layer or the thinlay can be removed and plaster-of-Paris can be used support the thinlay in the HWTT mounting system. In either case, AASHTO T 324 recommends a minimum specimen thickness of 38mm for HWTT.

Question: How long does it typically take for a state highway agency to implement a cracking test for BMD?
Answer: Most likely five years. Within this period, the agency is recommended to benchmark existing mix designs, develop preliminary test criteria and a provisional specification, construct shadow projects, monitor field performance, adjust test criteria (if needed), and finally, implement a full specification.

Comment: For state highway agencies interested in benchmarking current mix designs to establish performance criteria, priority should be given to mixes with known histories of field performance. The criteria should be set in a way to eliminate mixes that failed prematurely in the field. Meanwhile, contractors are highly recommended to conduct performance tests on their most produced mixes to have an idea of what the results would be.

Comment: The NCAT round robin performance testing experiment, upon completion (by Fall 2019), will provide preliminary information on the repeatability and reproducibility of APA, HWTT, I-FIT, IDEAL-CT, and other performance tests.

Comment: NCHRP project 09-57A (Texas A&M Transportation Institute) has completed the ruggedness evaluation for I-FIT and IDEAL-CT cracking tests. The final report should be available soon.

Comment: According to FHWA, the AMPT cyclic fatigue test results typically have a coefficient of variance (COV) of 15 to 25 percent.

Comment: Vermont DOT has recently implemented the Hamburg Wheel-Tracking Test to evaluate rutting resistance during mix design.

Comment: Utah is one of the states that implemented APA as a mixture rutting test about 20 years ago, but recently changed to HWTT. Over the past few years, Utah has been evaluating BBR sliver, I-FIT, and IDEAL-CT tests as mixture cracking tests for BMD. Utah has also implemented a delta Tc criterion of -1°C after 20 hours of PAV aging for their asphalt binder specifications.

Comment: A few state highway agencies have established requirements on the minimum asphalt binder content to mitigate "dry" mix issues. However, NCAT feels that this may not be a good practice because different aggregates will have different G_{sb} values and asphalt absorption values so the minimum asphalt content can be very different for different aggregates used within a state.

Comment: There are many different types of asphalt rejuvenators (including both bio-based and petroleum-based products) available on the market, but their ability to effectively improve cracking test results, especially after mix aging, varies significantly from product to product. Although numerous rejuvenators have shown promising laboratory results with mixtures containing high RAP contents and/or RAS, there have also been a few unsuccessful cases where the rejuvenated RAP/RAS mixtures failed prematurely in the field. Currently, there is no established laboratory procedure for the evaluation and approval of rejuvenators. NCAT is working on a research project for South Dakota DOT on this topic. One factor that will impact the success or failure of a particular rejuvenator is its dosage rate. In theory, the dosage of rejuvenator should be determined based on the amount of RAP and/or RAS and the properties of the aged binders in those materials. Blending charts (based on extracted binder blends) and mixture performance testing appear to be the two most promising approaches for determining the optimum dosage of rejuvenator.

Comment: Caution should be exercised when adding chemical additives (including rejuvenators, warm mix asphalt, and liquid anti-strip) into asphalt mixes containing polymer modified binders. Some of the additives may be not chemically compatible with the specific polymer used for asphalt modification. In such a case, the resultant mix will not perform as well as expected. This is another argument for the use of mixture performance tests in mix design and QA to assure that all of the individual components are compatible and can contribute the performance of the mixture as expected.

Comment: It is NCAT's opinion that the HWTT test temperature should be selected based on the climate of a project rather than the PG of the virgin binder used in the mix.

Open Discussion: Why are state DOTs and contractors interested in implementing BMD?

- State DOTs
  - Not much improvement in mix performance after implementing Superpave. Still seeing poor mixes being designed and produced but meeting all volumetric requirements.
  - BMD provides a better approach to evaluate/approve innovative/new products (e.g., rejuvenators, fiber additives, polymer modifications, etc.)
  - Contractors
    - As compared to volumetrics, performance test results provide a better indication of mix quality.
    - BMD allows for more flexibility during mix design

- Motivate contractors to be innovative for selecting mix components and stay competitive in the low-bid environment.

Open Discussion: What are the biggest obstacles for implementation of BMD?

- Performance testing during production (need test methods with quick turnaround on test results to limit risks)
- Selection of performance tests and criteria
- Improve binder specification (PG grade ≠ binder quality, additional performance-related parameters should be considered, such as ΔTc, MSCR, LAS, etc.)

Open Discussion: What mixture cracking tests have your agency decided or are considering to implement?

- Massachusetts: BBF test for bridge deck mixes; I-FIT and IDEAL-CT tests for regular mixes.
- Vermont: Special Provision for projects this fall with Hamburg and I-FIT.
- Pennsylvania: PennDOT has established a provisional specification on long-life pavements, which requires HWTT, OT, I-FIT, DCT, and low-temperature SCB testing. PennDOT also has a prospective research project on balanced asphalt mix design using I-FIT and IDEAL-CT tests.
- West Virginia: considering using HWTT and IDEAL-CT tests for balanced mix design.
- Maryland: MDOT had some experience with the I-FIT test and will investigate the use of HT-IDT and IDEAL-CT tests for balanced mix design in an upcoming research project.
- The New England states (including Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island) have sponsored a pooled fund study on balanced mix design, which is currently being conducted by Dr. Walaa Mogawer at the University of Massachusetts Dartmouth.

Open Discussion: How much experience do asphalt contractors have with mixture performance testing?

- One contractor operating in PA, DE, and VA reported having experience with HWTT, IDEAL-CT, and Cantabro, and participated in NCAT’s performance testing round robin experiment.
- One contractor operating in PA and NJ is planning to run the DCT test on their high RAP mixes.
- One contractor reported having experience with IDEAL-CT and Cantabro tests.