Subcommittee on Materials
Stateline, Nevada
Tuesday, August 6, 2013
2:30 PM to 4:00 PM

TECHNICAL SECTION 1a
SOIL AND UNBOUND RECYCLED MATERIALS TEST METHODS
MINUTES (minutes are in red bold font)

1. Vice-Chair Andy Babish/VA called the meeting to order at 2:32 p.m.
   a. **Chair Bob Burnett/NY and Bert Wintz/LA attended via conference call.**
   b. **The attendance list was circulated and then misplaced.**

2. TECHNICAL SECTION 1A INFORMATION
   a. List of test methods and standards assigned to TS1a.
   b. Test Methods assigned to individual members.

3. 2013 MID-YEAR MINUTES
   a. **The Minutes of the March 12, 2013 webinar meeting were approved as written.**

4. AMRL COMMENTS

AASHTO T 190 (2009) - Resistance R-Value and Expansion Pressure of Compacted Soils
Section: 4.4 and Figure 4
Revise Figure 4: Current Figure 4 shows a circular device with inner and outer lights. Many current exudation indicators use a linear arrangement of lights.
Revise 4.4: "On an exudation device with a circular light display, sStop the loading and record the exudation pressure when either five of the six outer lights on the exudation pressure device are lighted or three outer lights are lighted and free water is visible around the bottom of the mold. On an exudation device with a linear light display, stop the loading and record the exudation pressure when either five lights on the indicator are lighted or three lights are lighted and free water is visible around the bottom of the mold."
Rationale: *This establishes the correct use of an exudation pressure device with a linear light display. Currently, this type of exudation device is not permitted, however the concept is the same as with the circular light display.*

- **There were no members that indicated they have this type of device. Maria Knake of AMRL said that AMRL assessors occasionally see these types of devices in laboratories, and that one manufacturer currently makes this type of device.**
- **There are two changes needed – one to allow the linear light display, and another to allow the actual device. Mark Felag/RI made a motion to go to concurrent ballot. Ron**

Horner/ND seconded the motion. Unanimously approved.

AASHTO T 190 (2009) - Resistance R-Value and Expansion Pressure of Compacted Soils
Section: 8.2
Revise: "Place the standard metal specimen in the stabilometer chamber. Adjust the amount of air in the stabilometer cell by turning the pump handle at a rate of approximately 2 turns per second so that 2 ± 0.05 turns of the pump handle increase the liquid pressure from 34.4 to 689 kPa (5 to 100 psi) ~~with the standard metal specimen in the stabilometer chamber.~~.
Rationale: *There is currently no guidance on the rate of rotation to be used during the adjustment of the stabilometer.*

The AMRL suggestion was made so that the adjustment of the stabilometer is uniform with when the test is actually performed. Mike Santi/ID suggested that the Hveem test (AASHTO T 246) be reviewed since the tests use the same apparatus. T 246 and T 247 have the same language, and the Chairman said to put the wording in T 190. Suggestion to bundle all the T 190 comments into one concurrent ballot. A motion was made by Cole Mullis/OR to do that. Darren Hazlett/TX seconded the motion. Unanimously approved.

AASHTO T 217-02 (2010) – Determination of Moisture in Soils by Means of a Calcium Carbide Gas Pressure Moisture Tester
Section: 6.3
Revise: **"**Determine the percentage of moisture to the nearest 0.1 ~~whole~~ percent."
Rationale: *AASHTO T265 calculates moisture content to the nearest 0.1 percent. This standard also determines moisture content of soils so it should include the same accuracy and reporting requirements.*

Mark Felag/RI asked if the device was that accurate. Maria Knake/AMRL said the device reads to 0.1 percent. The Chairman expressed concern about the accuracy. Bob Lutz/AMRL and Maria Knake/AMRL indicated that the method needs a Precision & Bias statement. OR and ME perform this test and determine moisture to 0.1%. A concurrent ballot was suggested. Mark Felag/RI made the motion, and Cole Mullis/OR seconded the motion. Unanimously approved.

Editorial Comments

AASHTO T 190 (2009) - Resistance R-Value and Expansion Pressure of Compacted Soils
Section: Figure 6
Revise: "Forty-two 5/~~42 1/~~32 in.~~"~~ holes"
Rationale: *The current information is incorrect.*

This will be an editorial change.

AASHTO T 190 (2009) - Resistance R-Value and Expansion Pressure of Compacted Soils
Section: Figure 9

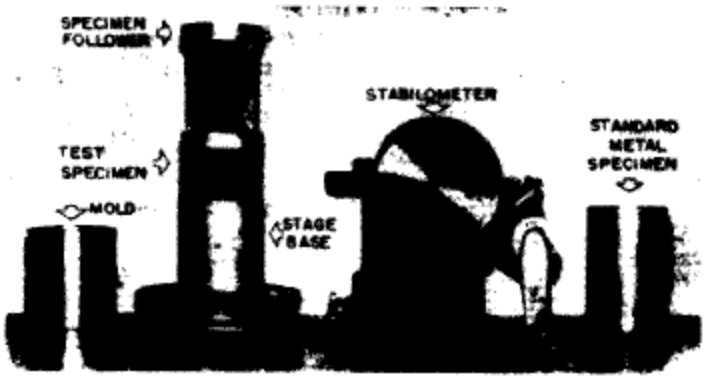

Figure 9—Stabilometer and Accessories

Revise: Remove Figure 9 or replace with a clearer updated diagram.

Mike Santi/ID will attempt to provide a better picture. This will be an editorial change.

AASHTO T 190 (2009) - Resistance R-Value and Expansion Pressure of Compacted Soils
Section: 7.1
Revise: "After determination of the exudation pressure, measure the compacted specimen height to the nearest 2.5 mm (0.1 in.). Allow the test specimen to rebound in a covered mold for at least 30 minutes ~~after determination of the exudation pressure and the compacted specimen height to the nearest 2.5 mm (0.1 in.)~~."
Rationale: *Establishes the order of operations clearly.*

The wording will be changed to this: "After determination of the exudation pressure, allow the test specimen to rebound in a covered mold for at least 30 minutes, then measure the compacted specimen height to the nearest 2.5 mm (0.1 in.)." Mark Felag/RI indicated that this change can be handled editorially. The group agreed.

AASHTO T217-02 (2010) – Determination of Moisture in Soils by Means of a Calcium Carbide Gas Pressure Moisture Tester
Sections: 5.2
Revise: "Weigh a sample of the exact mass specified by the manufacturer using ~~of the instrument in~~ the balance included ~~provided~~ with the instrument, and place the sample in the cap of the tester. When using the 20-g or 26-g sized tester, place two 31.75-mm (1.25-in.) steel balls in the body of the tester with the calcium carbide."

Rationale: *The wording in the standard is confusing to the reader.*

We need to clarify the wording and allow the option of putting the reagent in the cap. The Chairman previously suggested this wording: "Alternately, the reagent may be placed in the cap and the sample in the body to facilitate cleanup after the test." Maria Knake/AMRL indicated that the manufacturer's recommendations do not currently align with the test method. Rick Bradbury/ME said that by putting material in the cap, you can clean it out better between tests. Maria Knake/AMRL indicated there were comments on this item from

AR, OK, PA, and SC, and a negative from FL. AMRL's comment is suggested so that there is alignment between the test method and the manufacturer's recommendation, and for safety reasons. The Chairman stated that we should allow both methods, which is why he wrote the recommendation that he did. Maria Knake/AMRL said that what the Chairman has suggested would be appropriate. Tim Ruelke/FL made a motion to go to concurrent ballot, and James Williams/MS seconded the motion. Unanimously approved.

AASHTO T 289 (2008) – Determining pH of Soil for Use in Corrosion Testing
Section: 8.2
Revise: "8.2 A 50-mL wide-mouth glass beaker or other suitable container ~~with a watch glass for cover~~. If lightweight material is to be tested, it may be necessary to increase the beaker size up to a maximum of 250 mL.
8.3 A watch glass of suitable size to cover the beaker."
Rationale: *Shows that a watch glass is required for all beaker sizes.*

This will be an editorial change.

AASHTO T 296-10 - Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression
Section: 6.4
Revise: "…After a specimen is formed, with the ends perpendicular to the longitudinal axis, remove the mold and determine the mass and dimensions of the specimen using the devices described in Sections 5.11, ~~5~~.13, and 5.14.~~5.16.~~"
Rationale: *Section 5.11 and 5.14 reference the specimen-size measurement devices and weighing device. Section 5.16 references miscellaneous apparatus used to prepare and compact the specimen.*

This will be an editorial change.

AASHTO T 296-10 - Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression
Section: 7.1.1.
Revise: "If deemed necessary, check the rubber membrane for leaks. (See Section 5.10~~5.11.~~)."
Rationale: *This change identifies the correct section for checking the rubber membrane.*

This will be an editorial change.

AASHTO T 296-10 - Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression
Section: 10.4.1
Revise: "where:
P = measured applied axial load (corrected for uplift and piston friction; if required, see Section 8.~~2.5.~~1.3),"
Rationale: *This change references the correct section.*

This will be an editorial change.

5. BALLOTS

a. 2012 Subcommittee Letter Ballot results:

Comments resolved at mid-year meeting. Some subsequent actions are still underway.

b. **Technical Section 1a ballots:**

1. TS1a Ballot – Summer, 2013: This ballot will reconfirm 12 Test Standards **(all were reconfirmed without comments from the ballot that closed on 8/5/13):**

T 90, "Determining the Plastic Limit and Plasticity Index of Soils"
T 146, "Wet Preparation of Disturbed Soil Samples for Test"
T 176, "Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test"
T 194, "Determination of Organic Matter in Soils by Wet Combustion"
T 220, "Determination of the Strength of Soil-Lime Mixtures"
T 226, "Triaxial Compressive Strength of Undrained Rock Core Specimens Without Pore Pressure Measurements"
T 236, "Direct Shear Test of Soils under Consolidated Drained Conditions"
T 258, "Determining Expansive Soils"
T 267, "Determination of Organic Content in Soils by Loss on Ignition"
T 273, "Soil Suction"
T 289, "Determining pH of Soil for Use in Corrosion Testing"
T 291, "Determining Water-Soluble Chloride Ion Content in Soil"

2. **TS1a Ballot – Summer, 2013:** This ballot revises three standards:
Ballot a rewrite of T 215 as an A standard.
Ballot a rewrite of T 90 with a lot of AMRL recommended edits.
Ballot a rewrite of T 100 with a lot of AMRL recommended edits.

The ballot closed on 8/5/13 – all three passed, with some comments.
T 215 - Pending reconciliation of T 215, move it from a C standard to an A standard; motion for full SOM ballot made by GA, seconded by MS.
T 90 – motion for full SOM ballot made by MS, seconded by OR.
T 100 – motion for full SOM ballot made by MD, seconded by NE.

c. **Provisional standards:**

We have one provisional standard, PP-59-09, Coal Combustion Fly Ash for Embankments. It was extended in 2011 for two years. Action is required this year. It can be extended by voice vote at the annual meeting for two more years, or it can go to ballot to become a full standard at any time. Next year, it will have to go to subcommittee ballot, to be extended for one year or to become a full standard. Has anyone used it? What would we like to do?

The Chair asked if anyone was using PP-59 – GA indicated they looked at it during a research project and they prefer to keep it around; the Chair suggested a voice vote to extend PP-59 for two more years and work on it some more; GA mentioned EPA issues with fly ash waste; GA made a motion for a voice vote, RI seconded the motion. It was unanimously approved.

6. TASK FORCE REPORT(S):
   a. **TF 07-01 on T 190 "Resistance R-Value and Expansion Pressure of Compacted Soils" (AL, MT, RI):** Alabama, Montana, and Rhode Island volunteered to look into the ASTM equivalency of this Category B Standard. The latest ASTM revision was in 2007 (Extended in 2010). Currently T 190 is shown equivalent to D 2844-69 (1975). The task force was to evaluate needed revisions to the standard (the equivalency question and a graphing question) and provide a report to the Technical Section in 2008. There was also a question from AMRL about stress and strain rates during testing. Lyndi Blackburn (Thanks!) looked at this, and had the following responses:

There are a few differences in these two specifications (ASTM D2844-07 and AASHTO T 190-09) but they are basically the same with regards to content. A few corrections (I believe) were made to some of the fractions in the document. There are also two statements that are in D2844 and not included in T 190 which are shown in a comment. In regards to Maria's comment there are in two places where T 190 gives a loading requirement with no tolerance. ASTM D2844 does not have tolerances in their specification either, but I believe that it would be a good addition to the AASHTO specification given the nature of loading machines and their inability to load at constant rate without deviation. We are currently researching what some realistic tolerances would be for this equipment and loading rates.

We did contact the manufacturer of the equipment and they did not provide any insight as to what a good tolerance would be. Your suggestion of 5% sounds good for section 4.3, but I wonder if that might be too tight for section 8.2. Maybe 10% since that is such a small rate of movement (0.05 in/minute)?

Ballot a +/- 5% tolerance for Section 4.3, and a +/- 10% tolerance for Section 8.2 concurrently. (M/S); a motion was made by AL to move the proposed T 190 changes to concurrent ballot; RI seconded the motion. Unanimously approved.

7. OLD BUSINESS: (See Section 5)

   a. ASTM Equivalency Issues:

      There is a great deal of interest in deleting or updating to our own versions the Category C standards, to minimize our reliance on ASTM standards. We have T 215. Maria Knake from AMRL rewrote T 215 to allow use of the Trautwein-make apparatus and it seems to be different enough that we can declare it our own and make it an A standard. That is one of our TS ballots.

   b. T 146 does not produce a test result and should therefore not be a test, but a practice. This is what we did with T 92 previously. Would the stewards Nevada, FHWA, and Pennsylvania care to develop a rewritten standard?
      AMRL volunteered to take a look at T 92 and make the necessary changes.

c. T 176 has the word "referee" in Note 2. This dates back to when all of the words about method preferences said "referee." The other occurrences in the standard have been changed to "reference." The steward (Sheehy- NJ) agrees that it should now say "reference."
This change will be handled editorially.

8. NEW BUSINESS:

a. Editorial Queries for T 176, T 216, T258, T 273, and T 288 were received from the AASHTO publications staff. The queries, complete with answers from the chair, will be filed with the minutes to properly document these actions.
The editorial queries will be handled accordingly.

b. Scott Seiter reports that in T 89 there is an error in section 3.4.2 and 3.5. The reference to figure 2 of ASTM D 4318 should be figure 3 of ASTM.
These errors will be handled editorially.

c. A reminder of the current procedure for submittal of NCHRP Problem Statements for consideration by the SOM follows below:

Statements may be endorsed by individual technical sections, and then by the SOM as a whole at the annual meeting. Endorsed statements will be forwarded to NCHRP to be incorporated into the Standing Committee on Research's evaluation and ballot process for the program. If you can, forward your research needs statements to the appropriate technical section chairs before the summer meeting.

Statements are due to NCHRP by September 15th. AASHTO-endorsed statements are much more likely to be funded.

A statement was received from the chair of the TRB Committee on Geosynthetics (AFS 70) Barry Christopher, titled "Unbound Aggregate Layer Contamination Determination." See below. As TS4e, where this would normally belong, does not have a quorum at the annual meeting, can we endorse this and move it forward to the Subcommittee for endorsement (motion/second)?

Unbound Aggregate Layer Contamination Determination

I. Problem Statement

Road designs incorporate support layers suitable to bear anticipated traffic for a design life. When the strength of any of the support layers is diminished, the road life is shortened. Unbound aggregate bases and subbases have proven to be the most vulnerable of road support layers. Their loss of effective strength and thickness is most commonly due to the upward migration of subgrade soil fines which contaminate the unbound aggregate layer(s). This rapidly diminishes the strength and permeability of the contaminated section. Research by Jorenby and Hicks previously addressed this issue, demonstrating the dramatic loss of strength and permeability due to minimal subgrade contamination of unbound aggregates. Failed pavements are often reconstructed yet forensic analyses investigating the root cause of the

failure are rarely performed. The postulation is that most transportation agencies do not document or fully appreciate the loss of effectiveness of unbound layer material when large aggregate particles are separated and not in contact due to contamination. Without understanding the extent to which unbound aggregate is lost, pavement designers do not know to compensate for this loss in their design and pavements fail prematurely. Current separator/filtration criteria of D15-base <5 (D85) of the subgrade soil or separator, and D_{50}-base < 25 (D_{50})-separator layer are acceptable for steady state, one-way water flow, but are not appropriate for dynamic filtration that is required beneath a pavement where there maybe pumping action every time a truck passes over the road.

II. Research Objectives

This research is to define the typical or calculated loss of effective aggregate. Calculated loss would include the development of degradation factors for given aggregate base and subgrade characteristics that can be used in mechanistic design. This will dictate the need for either a thicker aggregate section to compensate for the loss within a given performance period or will require a means to prevent the contamination and the subsequent loss of strength, such as a separation geotextile. What is needed is a verification of field loss of effective thickness and strength of designed aggregate layers over time. Pavement reconstruction cycles need to be monitored and contaminated unbound aggregate layers need to be quantified and documented. Transportation agencies need to be engaged in this research providing opportunities for field forensic evaluations. Reconstruction sites offer the most practical opportunities, but pavement section coring and sampling may also be employed. Assignment of risk for contamination should be a product of this research as certain subgrade soils and aggregate gradations are more susceptible to contamination than others. The presence of water in the unbound aggregate and in the subgrade is an accelerant to the contamination process and should be considered. The research will evaluate the effectiveness of traditional graded granular filter criteria under pumping action that traffic often imposes on pavement support layers and allow for the development of improved design methods.

III. Estimate of Problem Funding and Research Period

The research could be accomplished for a cost of $350,000. The time required for the project would be two years, with two construction seasons to gather field data.

IV. Urgency, Payoff Potential, and Implementation

The principles of pavement preservation and perpetual or long life pavements must start with an assumption that original pavement support layers maintain their integrity, so this research is essential for these initiatives. State agency pavement design methodology often allow for sacrificial aggregate, but only in a general way that adds a set amount of aggregate to compensate for the anticipated loss of effective aggregate thickness due to subgrade soil contamination based on experience. The new Mechanistic-Empirical pavement design procedures do not directly consider contamination and designers are proceeding on blind faith that the full unbound aggregate layer thicknesses that are designed will still be fully functioning over the life of the pavement. Too much attention is being paid to the initial inherent properties of the unbound aggregate layers and few are looking at the big picture and realizing that aggregate loss purely due to contamination is the primary cause of strength and permeability deterioration of the layer(s). New pavement design methodologies need this research to incorporate this important factor that addresses the vulnerability of the designed

pavement support layers.
The research will produce practice ready results with a recommendation for either, an increase in aggregate to account for contaminated, reduced strength aggregate that should be included in flexible and rigid pavement design, or a recommendation that unbound aggregate layers be protected/preserved through the use of a separation geotextile or another form of separation, such as a graded granular filter layer. The efficacy of traditional graded granular filter design in the prevention of fines contamination of an aggregate will be challenged, considering the pumping action of traffic. Conditions most conducive to loss of effective unbound aggregate layer thickness will be identified. Sustainability of pavement construction and reconstruction is enhanced if aggregate resources are not wasted and unnecessary excavation and transport of materials can be eliminated.
V. Person(s) Developing the Problem
TRB Committee AFS70 Geosynthetics, TRB Committee AFP70 Mineral Aggregates
Sponsoring Committee: AFS70 Geosynthetics
Cosponsoring Committees: TRB Committee AFD70 Pavement Rehabilitation; TRB Committee AFH60 Flexible Pavement Construction and Rehabilitation; TRB Committee AFP70 Mineral Aggregates, TRB Committee AFD80 Strength and Deformation Characteristics of Pavement Sections, TRB Committee ASF60 Subsurface Drainage Date Posted: 02/28/2013

Amir Hanna gave a presentation; it is his opinion that this topic is being studied right now by NCHRP and we don't need to do anything about it at this time. As far as going forward, he thinks that this could be a continuation of the NCHRP project that currently exists – Amir and RI suggested making a note of this under the header before it gets submitted; the Chair indicated that if the group endorses the statement, we can figure out the fit with NCHRP later. The current NCHRP project is titled "Quantifying the Influence of Geosynthetics on Pavement Performance" and is geared toward the structural influence of geosynthetic reinforcement. Therefore, this study, which would investigate the loss of strength in unbound materials due to a lack of proper separation, will probably not be included in the existing research. MS made a motion to endorse the statement and RI seconded the motion. Unanimously approved.

<u>Other new business</u>

- **During the Executive meeting on Sunday, it was stated that every tech section should have a research coordinator and this person will act as a conduit for research information. GA will create a task force of a couple of people; Jay Jayaprakash from TRB has been working with Bob Burnett on making some connections to get information to AASHTO; Jay is working to put names to the cross-connections; every TRB committee is looking to name liaisons to parallel AASHTO groups; and we are trying to create our own CRC (Committee Research Coordinator) here at SOM. Bob Burnett will be the TS1a research coordinator, and Georgia will be asking for help from TRB so we can share info with committees, identify chairs, and name CRC's on each committee.**
- **We need to set a date for the next mid-year web meeting; the Chair will consider it and send out the date to everyone. RI asked if the meeting month is preferred in Jan./Feb. or Feb./March – GA said to go with end of Jan. to mid-March; AASHTO is collecting all of the webinar dates for each tech section and will create a calendar.**

9. ADJOURNMENT.
   The meeting adjourned at 3:51 p.m. RI made the motion to adjourn and MS seconded the motion.

TS 1a
Ballot Items

Num.	Ballot Item	SOM	Concurrent
1	SOM ballot item to revise T90. See pages 5 and 11-16 of the minutes.	X	
2	SOM ballot item to revise T100. See pages 5 and 17-26 of the minutes.	X	
3	Concurrent ballot item to revise T190. See pages 1, 2, 3, 6 and 27-39 of the minutes.		X
4	SOM ballot item to revise T215 and move it from a C to an A standard. See pages 5 and 40-53 of the minutes.	X	
5	Concurrent ballot item to revise T217. See pages 2, 3, 4, and 54-58 of the minutes.		X

Revisions to AASHTO T 90

Summary of Major Changes:

- Passive voice removed throughout the standard, where possible.
- **Section 1:**
  - Added clarification on the use of the two methods0 Hand Rolling and Plastic Limit Device.
  - Added statement indicating that this method is often used in conjunction with T 89.
- **Section 3:**
  - Added requirements for the use of paper as a rolling surface to ensure that a flat surface free of foreign matter is used.
  - Clarified use of balance so that the type of balance to be used corresponds to the available balance classes and accuracy requirements stated in AASHTO M 231.
- **Section 4:**
  - Added a new Section 4 and renumbered all following sections accordingly.
  - The new section includes guidance statements on the use of AASHTO PP 57 and R 18 for equipment calibration, standardization, and check.
- **Section 5:**
  - Added a note to indicate that enough moisture should be added to the soil so that is does not crumble on the first roll.
- **Section 6:**
  - Added a new first step to the procedure that indicates that the mass of the moisture content container should be determined.
  - Section 6.3.1:
    - Deleted description of paper as "laying on a smooth horizontal surface" and moved this requirement to the apparatus section, Section 3.
    - Moved description on had pressured based on soil type to a Note, since this is non-mandatory information.
  - Section 6.4:
    - Reworded description of repetition of the rolling process to add clarity and brevity.
    - Moved the description of the crumbling behavior of different soils to a note, since this is non-mandatory information.
    - Moved the description of the shape of the ellipsoidal mass for feebly plastic soils to a note, since this is non-mandatory information.
  - Section 6.6: Changed "containers" to "container" to indicate that only one moisture content is needed per soil tested. Added an additional statement indicating that this is the case.

Revisions to AASHTO T 90 (Continued)

- **Section 7:**
  - Re-wrote Section 6.1 to simply refer to T 265 for moisture content calculations and deleted Equation 1. Renumbered all proceeding equations. The text in Section 6.6 already refers to T 265, so this section should refer to it as well for consistency. In addition, Equation 1 is not the same as the equation provided in T 265.

Revisions to AASHTO T 100-06[1]

Summary of Major Changes:

- **Section 1:**
  - Moved information on calculation of the weighted average to Section 10.
- **Section 5:**
  - Clarified use of balance so that the type of balance to be used corresponds to the available balance classes and accuracy requirements stated in AASHTO M 231.
  - Added apparatus for removing entrapped air.
  - Redefined thermometer requirements, including appropriate alternatives to liquid-in-glass thermometers. The wording for these requirements was developed based upon recommendations from thermometry experts at the National Institute of Standards and Technology (NIST).
  - Added distilled water to required apparatus.
  - Added dispersing equipment from AASHTO T 88 for samples containing natural moisture.
- **Section 6:**
  - Added a new Section 6 and renumbered all following sections accordingly.
  - The new section includes guidance statements on the use of AASHTO PP 57 and R 18 for equipment calibration, standardization, and check.
- **Section 8:**
  - Added clarification to Note 4 to state that is Kerosene is used in place of water, the temperature correction factor should be based on the relative density of kerosene, not water.
  - Re-wrote equation in a universally-understood format.
- **Section 11:**
  - Re-wrote equations into a universally-understood format.
  - Added guidance on calculating a weighted average specific gravity if this test is used in conjunction with AASHTO T 85 (moved from Section 1).
- **Section 12:**
  - Deleted statement that the standard is the same as ASTM D 854-00. The two standards are significantly different, and even more so with the aforementioned revisions.