

SUBCOMMITTEE ON MATERIALS

2017 Annual Meeting – Phoenix, AZ

Tuesday, August 8, 2017

10:15 AM – 12:00 PM MST

TECHNICAL SECTION 1b

Geotechnical Exploration, Instrumentation, Stabilization and Field Testing

I. Call to Order and Opening Remarks

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

II. Roll Call – Membership List

Name	Affiliation	State	Email Address	Designation	Type
James Williams, III	Mississippi DOT	MS	jwilliams@mdot.state.ms.us	Chair	Voting
Lyndi Blackburn	Alabama DOT	AL	blackburnl@dot.state.al.us	Vice Chair	Voting
Evan Rothblatt	AASHTO	DC	erothblatt@ashto.org	AASHTO Staff	Non-Voting
Matthew Bluman	AASHTO Re:source	MD	mbluman@ashtoresource.org	Liaison	Non-Voting
Brian Johnson	AASHTO Re:source	MD	bjohnson@ashtoresource.org	Liaison	Non-Voting
Kaye Davis	Alabama DOT	AL	chancellor@dot.state.al.us	Member	Non-Voting
Phil Stolarski	California DOT	CA	phil.stolarski@dot.ca.gov	Member	Voting
James Connery	Connecticut DOT	CT	James.Connery@ct.gov	Member	Non-Voting
Leo Fontaine	Connecticut DOT	CT	Leo.Fontaine@ct.gov	Member	Voting
David Horhota	Florida DOT	FL	david.horhota@dot.state.fl.us	Member	Voting
Garth Newman	Idaho Transportation Department	ID	garth.newman@itd.idaho.gov	Member	Voting
Daniel Tobias	Illinois DOT	IL	daniel.tobias@illinois.gov	Member	Voting
Sejal Barot	Maryland DOT	MD	sbarot@sha.state.md.us	Member	Voting
Eric Frempong	Maryland DOT	MD	efrempong@sha.state.md.us	Member	Non-Voting
Maria Knake	AASHTO Re:source	MD	mknake@ashtoresource.org	Member	Non-Voting
Steven Lenker	AASHTO Re:source	MD	slenker@ashtoresource.org	Member	Non-Voting
Gregory Uherek	AASHTO Re:source	MD	guherek@ashtoresource.org	Member	Non-Voting
William Sullivan	Mississippi DOT	MS	wsullivan@mdot.ms.gov	Member	Non-Voting
Denis Boisvert	New Hampshire DOT	NH	Denis.Boisvert@dot.nh.gov	Member	Non-Voting
Charles Dusseault	New Hampshire DOT	NH	chuck.dusseault@dot.nh.gov	Member	Voting
Darin Tedford	Nevada DOT	NV	dtedford@dot.state.nv.us	Member	Voting
Donald Streeter	New York State DOT	NY	donald.streeter@dot.ny.gov	Member	Voting
Scott Seiter	Oklahoma DOT	OK	sseiter@odot.org	Member	Voting
Sean Parker	Oregon DOT	OR	Sean.P.Parker@odot.state.or.us	Member	Voting
Merrill Zwanka	South Carolina DOT	SC	zwankame@scdot.org	Member	Voting
Travis Smith	Tennessee DOT	TN	travis.w.smith@tn.gov	Member	Voting
Darren Hazlett	Texas DOT	TX	darren.hazlett@txdot.gov	Member	Voting
Charles Babish	Virginia DOT	VA	andy.babish@vdot.virginia.gov	Member	Voting
Anne Holt	Ontario Ministry of Transportation	ON	anne.holt@ontario.ca	Associate Member	Non-Voting
Becca Lane	Ontario Ministry of Transportation	ON	Becca.Lane@ontario.ca	Associate Member	Voting
Stephen Lee	Ontario Ministry of Transportation	ON	stephen.lee@ontario.ca	Associate Member	Non-Voting
Carole Anne MacDonald	Ontario Ministry of Transportation	ON	Caroleanne.macdonald@ontario.ca	Associate Member	Non-Voting
Tim Aschenbrener	Federal Highway Administration	DC	timothy.aschenbrener@dot.gov	Ex Officio	Non-Voting
Benjamin Rivers	Federal Highway Administration	DC	benjamin.rivers@fhwa.dot.gov	Ex Officio	Non-Voting
Jack Springer	Federal Highway Administration	DC	jack.springer@dot.gov	Ex Officio	Non-Voting
Michael Voth	Federal Highway Administration	DC	michael.voth@dot.gov	Ex Officio	Non-Voting
David Savage	Construction Materials Eng. Council	FL	davesavage@cmecc.org	Friend	Non-Voting
Dick Reaves	Troxler Electronic Laboratories, Inc.	NC	dreaves@troxlerlabs.com	Friend	Non-Voting
Ali Regimand	InstroTek, Inc.	NC	aregimand@instrotek.com	Friend	Non-Voting
Desna Bergold	D B Consulting and Associates, LLC	UT	desna@dbconllc.com	Friend	Non-Voting
Pete Holter	AASHTO Re:source	MD	pholter@ashtoresource.org	Other	None

III. Approval of Technical Section Minutes

2017 Mid-Year Minutes distributed with this agenda. (**Attachment A, Pages 4-15**)

IV. Old Business

A. SOM Ballot Items

1. Outstanding items from Mid-Year Meeting? – I don't have any.

B. TS Ballots

1. TS 1b Ballot 1

Revise T 99 and T 180 to delete the 2-inch sieve from the equipment list.

Ballot Results see **Attachment B**

C. Task Force Reports

TASK FORCE 10-04:

Support for the provisional standard for the In-Place Determination of Density and Water Content of Soil and Aggregate by Subsurface Electrical Method. TP 112

- Dennis Anderson, Cecil Jones, Darin Tedford (NV), Delaware, Mississippi
- Presentation by Cecil and Dennis – updating everyone.
- This standard is up for a 2-year extension this year.

TASK FORCE 12-02:

Address negative votes and comments related to Technical Section Ballot 12-04 to revise T 99 and T 180.

- Garth Newman (WAQTC), Scott Seiter (OK), Jamie Blanton (LA), David Horhota (FL), James Williams (MS)

– Sent Ballot Comments to TF

Comments received back from members of the Task Force indicate that the added language in 5.5.1 should also be included in Section 9 for Method C Procedure.

And in addition, Notes 6, 7, and 8 should also be included in Method C. The only difference is Method A (4" diameter mold) is intended for material passing the No. 4 sieve, and Method C (4" diameter mold) is intended for material passing the 0.75-in. sieve.

NEED TO MAKE SURE THIS GOT DONE.

TASK FORCE 16-01:

Write Procedure for Calibration Blocks (Remaining work from TF 11-01). Research inclusion of devices such as the e-Gauge into T 310

- Lyndi Blackburn (AL)(Chair), Sejal Barot (MD), Greg Stellmach (OR), Delaware, Jeff Seiders (Raba-Kistner), Greg Uherek (AASHTO re:source)
- See **Attachment C** for proposed language. Many thanks to Robert Shugart, Oak Metcalf, and Mike San Angelo.

TASK FORCE 17-01:

Proposed new provisional standard or revise R 13, "Conducting Geotechnical Investigations" to include the DIGGS data program. Ben was going to solicit help from LA, OH, and MO since they have data management systems that utilize DIGGS data.

- Ben Rivers, FHWA (Chair)

V. New Business

A. Research Proposals

1. 20-7 RPS
2. Full NCHRP RPS

B. AASHTO Re:source/CCRL - Observations from Assessments?

C. NCHRP Issues

- D. Correspondence, calls, meetings
- E. Presentation by Industry/Academia
- F. Proposed New Standards
- G. Proposed New Task Forces

- H. Standards Requiring Reconfirmation
 - 1. T 134-05 (2013) *Moisture–Density Relations of Soil–Cement Mixtures*
 - 2. T 191-14 *Density of Soil In-Place by the Sand-Cone Method*
 - 3. T 206-09 (2013) *Penetration Test and Split-Barrel Sampling of Soils*
 - 4. T 252-09 (2013) *Measurements of Pore Pressures in Soils*
 - 5. TP 100-12 (2016) *Deep Foundation Elements under Bidirectional Static Axial Compressive Load*
 - 6. TP 112-14 (2016) *Determining In-Place Density and Moisture Content of Soil and Soil–Aggregate Using Complex Impedance Methodology*
- I. SOM Ballot Items (including any ASTM changes/equivalencies)

VI. Open Discussion

VII. Adjourn



SUBCOMMITTEE ON MATERIALS

2017 Mid-Year Meeting
 Tuesday, February 7, 2017
 2:00 PM – 3:00 PM EST

TECHNICAL SECTION 1b

Geotechnical Exploration, Instrumentation, Stabilization and Field Testing

Meeting Minutes

I. Call to Order and Opening Remarks

Name Change was discussed.

James Williams will be stepping down as Chair, but he will continue working with the SOM. He thanked everyone for their efforts.

II. Roll Call – Membership List (Appendix 1)

Attendees:

Lyndi Blackburn	Alabama DOT	Scott Seiter	Oklahoma DOT
Kaye Chancellor	Alabama DOT	Chris Clarke	Oklahoma DOT
Rich Giessel	Alaska DOT	Steve Bettis	Oklahoma DOT
Michael Benson	Arkansas DOT	Carole Anne MacDonald	Ontario MTO
Bill Schiebel	Colorado DOT	Greg Stellmach	Oregon DOT
Ben Rivers	FHWA	Temple Short	South Carolina DOT
David Horhota	Florida DOT	Merrill Zwanka	South Carolina DOT
Garth Newman	Idaho DOT	Travis Smith	Tennessee DOT
Heather Shoup	Illinois DOT	Robert Jowers	Tennessee DOT
James Williams	Mississippi DOT	Matt Bluman	AASHTO
Griffin Sullivan	Mississippi DOT	Brian Johnson	AASHTO
Denis Boisvert	New Hampshire DOT	Joe Williams	AASHTO
Don Streeter	New York DOT	Steve Lenker	AASHTO
Steven Heiser	New York DOT		

III. Approval of Technical Section Mid-Year Webinar Minutes

The Technical Section 1b Annual Meeting was held on Tuesday, August 2, 2016 at 10:15 AM – 12:00 PM EST. The Annual Meeting Minutes are attached as **Appendix A**.

Minutes Approval: Motion - OK, Second - NY, no discussion, minutes approved.

IV. Old Business

A. 2016 SOM Ballot Items Appendix B

Item Number 3	SOM ballot item to revise T 99 Section 1.4 and A1 for application of the oversized particle correction. See Pages 3 – 4 and 98 - 112 of the TS 1b Minutes.
Decisions:	Affirmative: 43 of 51

	Negative: 0 of 51 No Vote: 8 of 51
	<i>Comments: (All Editorial)</i>
Kansas Department of Transportation (Richard A Barezinsky) (rick.barezinsky@ks.gov)	<ul style="list-style-type: none"> - Listing requirements in 3.2.1 and 3.2.2 in parallel would make comparing the two Rammers easier. i.e. the mass listed first in 3.2.2, etc. - Note 4 should be consistent between T99 and T180. T99 has 152.40 mm and 101.60 mm and T180 has 152 mm and 102 mm. Also, show English equivalent to 11.5 kg - 5.3 show English equivalent for the other 305 mm height. - 9.5 Consistency with units - show the English equivalent to 19.0 mm and 4.75 mm - These will be considered editorial and will be made prior to publishing.
Florida Department of Transportation (Timothy J. Ruelke) (timothy.ruelke@dot.state.fl.us)	<p>A similar subsection as was added to Method A (5.5.1. One additional determination over optimum moisture is sufficient for non-cohesive, drainable soils) needs to be added to Method C (as subsection 9.5.1)</p> <ul style="list-style-type: none"> - Discussion: this was submitted in the wrong section, but we will consider addressing this as an editorial change prior to publishing.
Item Number 4	SOM ballot item to revise T 180 Section 1.4 and A1 for application of the oversized particle correction. See Pages 3 – 4 and 113 - 127 of the TS 1b Minutes.
Decisions:	Affirmative: 43 of 51 Negative: 0 of 51 No Vote: 8 of 51
	<i>Comments: (All Editorial)</i>
Kansas	Same Comments as above.
Pennsylvania Department of Transportation (Timothy L Ramirez) (tramirez@pa.gov)	<p>In Section 1.4, revise the proposed new sentence to be exactly the same as the proposed new language in T 99, Section 1.4. There is slight difference between the two and the language in T 99 reads more clearly (i.e., revise from "by weight of the oversized particles" to "by weight of oversized particles").</p> <p>These will be considered editorial and will be made prior to publishing.</p>
Item Number 5	SOM ballot item to revise M 147 Section 1.1 clarifying the term "normal" as it relates to specific gravity and absorption. See Pages 128 - 131 of the TS 1b Minutes.
Decisions:	Affirmative: 43 of 51 Negative: 0 of 51 No Vote: 8 of 51
	<i>Comments:</i>
Kansas	<p>3.2.2 list (No. 40) after 0.425-mm</p> <p>Format Table 1 Standard sieve designations so they align.</p> <p>These will be considered editorial and will be made prior to publishing.</p>

B. 2016 SOM Concurrent Ballot Items **Appendix B**

Item Number 6	Concurrent ballot item to revise T 99 Section 5.5. See Pages 6 and 98 - 112 of the TS 1b Minutes.
Full Subcommittee Decisions: Affirmative: 43 of 51 Negative: 0 of 51 No Vote: 8 of 51	Technical Section Decisions: Affirmative: 14 of 18 Negative: 0 of 18 No Vote: 4 of 18
	<i>Comments:</i>
Oklahoma Department of Transportation (Scott Seiter) (sseiter@odot.org)	There is some redundant language in section 5.5.2 and Note 8. This is probably an editorial issue. We will consider this to see if we can make the editorial change.
Florida Department of Transportation (Timothy J. Ruelke) (timothy.ruelke@dot.state.fl.us)	A similar subsection as was added to Method A (5.5.1. One additional determination over optimum moisture is sufficient for non-cohesive, drainable soils) needs to be added to Method C (as subsection 9.5.1). We will consider this to see if we can make the editorial change.
Item Number 7	Concurrent ballot item to revise T 180 Section 5.5. See Pages 6 and 113 - 127 of the TS 1b Minutes.
Full Subcommittee Decisions: Affirmative: 43 of 51 Negative: 0 of 51 No Vote: 8 of 51	Technical Section Decisions: Affirmative: 14 of 18 Negative: 0 of 18 No Vote: 4 of 18
	<i>Comments:</i>
Oklahoma Department of Transportation (Scott Seiter) (sseiter@odot.org)	There is some redundant language in section 5.5.1 and Note 8. This is probably an editorial issue. Section 5.5.2 is "orphaned" in T 180. I believe the intent was for it to be the same as in T 99. We will consider this to see if we can make the editorial changes.
Florida	Same Comment as above. We will consider this to see if we can make the editorial changes.

C. TS Reconfirmation Ballot **Appendix B**

The reconfirmation ballot seemed to be more clear to everyone this time. We will continue to proceed with these reconfirmation ballots this way in the future.

All Items:	Affirmative: 17 of 18 Negative: 0 of 18 No Vote: 1 of 18
Item Number 1	M 057-80 (2012) Materials for Embankments and Subgrades
	<i>Comments:</i>
Federal Highway Administration (Benjamin Rivers) (benjamin.rivers@fhwa.dot.gov)	Concur with reconfirmation. Consider establishing a Taskforce to develop a provisional standard for air-voids content based embankment and subgrade compaction requirements. Rationale: With the exception of clean granular materials, soils are moisture sensitive. Control of compaction, based on air-voids content, would provide more consistent and predictable engineering properties and performance behavior, and would provide for a more compatible acceptance criteria with intelligent compaction technology and stiffness-based testing systems.

	<p>As we look to intelligent compaction, we need some quality assurance standards in place to confirm the outcomes. We would like to see some industry people to help the TS develop these standards. Ray Wood (Fugro) and some others would be good to bring into the effort. This is expected to take a few years. Ben will lead the effort. Other members: Garth Newman (ID), Chris Clarke (OK), and whoever can be signed up from TS 1c* on Aggregates since this will be a joint effort.</p> <p>*During the TS 1c meeting, there was a discussion on the modified Proctor test (T 180) being performed on granular materials and the problems this is creating due to crushing of materials in the field. Scott Seiter (OK) wondered if this might be a joint effort with TS 1c. James Williams (MS) agreed.</p>
Item Number 2	M 145-91 (2012) Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
	<i>Comments: None</i>
Item Number 3	M 146-91 (2012) Terms Relating to Subgrade, Soil-Aggregate, and Fill Materials
	<i>Comments: None</i>
Item Number 4	R 045-13 Installing, Monitoring, and Processing Data of the Traveling Type Slope Inclinator
	<i>Comments:</i>
Federal Highway Administration (Benjamin Rivers) (benjamin.rivers@fhwa.dot.gov)	<p>Concur with reconfirmation. Consider updating to incorporate MEMs automated systems and data-loggers.</p> <p>This should be considered through the work of a Task Force. Ben Rivers will chair, Lyndi with AL will participate.</p>
Item Number 5	T 135-13 Wetting-and-Drying Test of Compacted Soil-Cement Mixtures
	<i>Comments: None</i>
Item Number 6	T 136-13 Freezing-and-Thawing Tests of Compacted Soil-Cement Mixtures
	<i>Comments: None</i>
Item Number 7	T 221-90 (2012) Repetitive Static Plate Load Tests of Soils and Flexible Pavement Components for Use in Evaluation and Design of Airport and Highway Pavements
	<i>Comments: None</i>
Item Number 8	T 222-81 (2012) Nonrepetitive Static Plate Load Test of Soils and Flexible Pavement Components for Use in Evaluation and Design of Airport and Highway Pavements
	<i>Comments: None</i>
Item Number 9	T 223-96 (2012) Field Vane Shear Test in Cohesive Soil
	<i>Comments: None</i>
Item Number 10	T 310-13 In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods

	(Shallow Depth)
	<i>Comments:</i>
Federal Highway Administration (Benjamin Rivers) (benjamin.rivers@fhwa.dot.gov)	Concur with reconfirmation. Consider incorporating recently developed lower-radiation systems. There is an ongoing Task Force, but their work is not related to this item. A few states mentioned that they are not implementing the use of these gauges at the moment.

D. Task Force Reports

TASK FORCE 10-04:

Development of a new provisional standard for the In-Place Determination of Density and Water Content of Soil and Aggregate by Subsurface Electrical Method. TP 112

- Dennis Anderson, Cecil Jones, Darin Tedford (NV), Delaware, Mississippi

No activity to report.

TASK FORCE 12-01:

Address comments on Technical Section Ballot 12-01 to revise M 147.

- Andy Babish (VA), Jamie Blanton (LA), Scott Seiter (OK), Sejal Barot (MD), and James Williams (MS)
 - Sent Ballot Comment to TF.

This TF will be discontinued.

TASK FORCE 12-02:

Address negative votes and comments related to Technical Section Ballot 12-04 to revise T 99 and T 180.

- Garth Newman (WAQTC), Scott Seiter (OK), Jamie Blanton (LA), David Horhota (FL), James Williams (MS)

- Sent Ballot Comments to TF

Comments received back from members of the Task Force indicate that the added language in 5.5.1 should also be included in Section 9 for Method C Procedure.

And in addition, Notes 6, 7, and 8 should also be included in Method C. The only difference is Method A (4" diameter mold) is intended for material passing the No. 4 sieve, and Method C (4" diameter mold) is intended for material passing the 0.75-in. sieve.

We will look to see if we can make these changes editorially or if a new ballot needs to be created.

TASK FORCE 16-01:

Write Procedure for Calibration Blocks (Remaining work from TF 11-01). Research inclusion of devices such as the e-Gauge into T 310

- Lyndi Blackburn (AL)(Chair), Sejal Barot (MD), Oregon, Delaware, Jeff Seiders (Raba-Kistner), Greg Uherek (AASHTO re:source)
 - Sent Ballot Comment to TF.

No action at this point.

V. New Business

A. Research Proposals

1. 20-7 RPS
2. Full NCHRP RPS

Scott Seiter (OK) said that the compaction control in T180 issue might be good for an NCHRP project.

Ben Rivers (FHWA) said that there is a research proposal for site variability that needs to be reworked to address the variables without being too prescriptive. NC is working on this RPS.

- B. AASHTO re:source/CCRL - Observations from Assessments?
- C. NCHRP Issues
- D. Correspondence, calls, meetings
 - Received the following question on AASHTO T 180 via email (Appendix C):

In 1995 edition, it indicated section (2) about apparatus to a sieve (50-mm) to be within the test requirements (method C), according to the note No. (8) Of the same specification. But in subsequent editions in 2015 and most recently Edition specification also indicated in section apparatus (clause # 3.7) into sieves used in the test, including a sieve (50-mm). However, every specification did not specify how to use the sieve in the preparation of sample or the other.

Therefore, I would like to know the reason for the inclusion of the sieve (50-mm) from within the tools or devices used in the test and why it is not used.

Alabama and AASHTO re:source reviewed the question, determined that the 2 inch (50mm) could be deleted, and proposes to send the amended T 99 and T 180 to Technical Section Ballot. There needs to be a TS ballot item created to remove the requirement for the 2-inch sieve from T 99 and T 180. (Appendix 2) Garth Newman (ID) also commented that references to T 248 need to be changed to R 76 in the next edition.
- E. Presentation by Industry/Academia – if you want to see any presentations at the annual meeting, please let James Williams (MS) or Lyndi Blackburn (AL) know prior to the annual meeting.
- F. Proposed New Standards – There was a presentation from Dr. Isaac Howard and Griffin Sullivan on the device that allows for compaction of soil cement or chemically treated materials. There is a task established for them to draft an AASHTO-formatted standard that can be balloted in TS 1b. This will be presented once there is something to present.
- G. Proposed New Task Forces
- H. Standards Requiring Reconfirmation
- I. SOM Ballot Items (including any ASTM changes/equivalencies)

VI. Open Discussion

Ben Rivers (FHWA) mentioned that it would be good to have a Task Force on creating a provisional standard that includes the DIGGS data program. He wonders if it should be a new R standard or a modification to R 13. No one volunteered to participate. LA, OH, MO all have developed some data management systems that use the DIGGS data. Ben will organize the task force and reach out to those states to see if they want to participate. Ben will report back to the TS at the annual meeting.

James thanked everyone for their time and participation. His duties have changed, but he plans to stay involved in the work of the SOM. With that, the meeting is adjourned, and we will see you at the next meeting in Phoenix.

VII. Adjourn

I. Roll Call – Membership List (February 2017)

Name	e-mail Address	Affiliation	Designation	Type	Present
Williams, III, James A.	jwilliams@mdot.state.ms.us	Mississippi Department of Transportation	Chair	Voting	
Blackburn, Lyndi D	blackburnl@dot.state.al.us	Alabama Department of Transportation	Vice Chair	Voting	
Johnson, Brian	bjohnson@amrl.net	AASHTO Material Reference Laboratory	Liaison	Non-Voting	
Lacinak, Henry	hlacinak@aaashto.org	American Association of State Highway and Transportation Officials	Liaison	Non-Voting	
Rothblatt, Evan	erothblatt@aaashto.org	American Association of State Highway and Transportation Officials	Liaison	Non-Voting	
Knake, Maria	mknake@amrl.net	AASHTO Material Reference Laboratory	Member	Non-Voting	
Uherek, Greg	guherek@amrl.net	AASHTO Material Reference Laboratory	Member	Non-Voting	
Lenker, Steven E.	slenker@amrl.net	AASHTO Material Reference Laboratory	Member	Non-Voting	
Davis, Kaye C	chancelork@dot.state.al.us	Alabama Department of Transportation	Member	Non-Voting	
Stolarski, Phil J	phil.stolarski@dot.ca.gov	California Department of Transportation	Member	Voting	
Fontaine, Leo Louis	Leo.Fontaine@ct.gov	Connecticut Department of Transportation	Member	Voting	
Aschenbrener, Tim	timothy.aschenbrener@dot.gov	Federal Highway Administration	Member	Non-Voting	
Lopez, Aramis	aramis.lopez@dot.gov	Federal Highway Administration	Member	Non-Voting	
Rivers, Benjamin	benjamin.rivers@fhwa.dot.gov	Federal Highway Administration	Member	Voting	
Springer, Jack	jack.springer@dot.gov	Federal Highway Administration	Member	Non-Voting	
Voth, Michael D	michael.voth@dot.gov	Federal Highway Administration	Member	Non-Voting	
Horhota, David J	david.horhota@dot.state.fl.us	Florida Department of Transportation	Member	Voting	
Newman, Garth H	garth.newman@itd.idaho.gov	Idaho Transportation Department	Member	Voting	
Frempong, Eric M	efrempong@sha.state.md.us	Maryland Department of Transportation	Member	Non-Voting	
Barot, Sejal	sbarot@sha.state.md.us	Maryland Department of Transportation	Member	Voting	
Tedford, Darin P	dtedford@dot.state.nv.us	Nevada Department of Transportation	Member	Voting	
Boisvert, Denis M.	dboisvert@dot.state.nh.us	New Hampshire Department of Transportation	Member	Non-Voting	
Dusseault, Charles R.	cdusseault@dot.state.nh.us	New Hampshire Department of Transportation	Member	Voting	
Streeter, Donald	donald.streeter@dot.ny.gov	New York State Department of Transportation	Member	Voting	
Seiter, Scott	sseiter@odot.org	Oklahoma Department of Transportation	Member	Voting	
Franco, Colin A	colin.franco@dot.ri.gov	Rhode Island Department of Transportation	Member	Voting	
Zwanka, Merrill E	zwankame@scedot.org	South Carolina Department of Transportation	Member	Voting	
Smith, Travis W.	travis.w.smith@tn.gov	Tennessee Department of Transportation	Member	Voting	
Heinen, Caroline	caroline.heinen@txdot.gov	Texas Department of Transportation	Member	Voting	
Babish, Charles A.	andy.babish@vdot.virginia.gov	Virginia Department of Transportation	Member	Voting	
Lane, Becca	Becca.Lane@ontario.ca	Ontario Ministry Of Transportation	Associate Member	Voting	
Holt, Anne Lee	anne.holt@ontario.ca	Ontario Ministry Of Transportation	Associate Member	Non-Voting	
Lee, Stephen	stephen.lee@ontario.ca	Ontario Ministry Of Transportation	Associate Member	Non-Voting	
Jones, Cecil L	cecil.jones@nc.rr.com	American Concrete Institute	Friend	Non-Voting	
Savage, David A	davesavage@cmec.org	Construction Materials Engineering Council	Friend	Non-Voting	
Regimand, Ali	aregimand@instrotek.com	InstroTek, Inc.	Friend	Non-Voting	
Reaves, Dick	dreaves@troxlerlabs.com	Troxler Electronic Laboratories, Inc.	Friend	Non-Voting	

Standard Method of Test for

Moisture-Density Relations of Soils
Using a 2.5-kg (5.5-lb) Rammer and
a 305-mm (12-in.) Drop

AASHTO Designation: T 99-15



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

- 3.2.3. *Rammer Face*—The circular face rammer shall be used, but a sector face may be used as an alternative, provided the report shall indicate type of face used other than the 50.8-mm (2-in.) circular face, and it shall have an area equal to that of the circular face rammer.
- 3.3. *Sample Extruder (for Solid-Walled Molds Only)*—A jack, lever, frame, or other device adopted for the purpose of extruding compacted specimens from the mold.
- 3.4. *Balances and Scales*—A balance or scale conforming to the requirements of M 231, Class G 5. Also, a balance conforming to the requirements of M 231, Class G 2.
Note 4—The capacity of the metric balance or scale should be approximately 11.5 kg when used to weigh the 152.40-mm (6-in.) mold and compacted, moist soil; however, when the 101.60-mm (4-in.) mold is used, a balance or scale of lesser capacity than the 11.5 kg may be used, if the sensitivity and readability is 1 g.
- 3.5. *Drying Oven*—A thermostatically controlled drying oven capable of maintaining a temperature of $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$) for drying moisture samples.
- 3.6. *Straightedge*—A hardened-steel straightedge at least 250 mm (10 in.) in length. It shall have one beveled edge, and at least one longitudinal surface (used for final trimming) shall be plane within 0.250 mm per 250 mm (0.01 in. per 10 in.) (0.1 percent) of length within the portion used for trimming the soil (Note 5).
Note 5—The beveled edge may be used for final trimming if the edge is true within a tolerance of 0.250 mm per 250 mm (0.1 percent) of length; however, with continued use, the cutting edge may become excessively worn and not suitable for trimming the soil to the level of the mold. The straightedge should not be so flexible that trimming the soil with the cutting edge will cause a concave soil surface.
- 3.7. *Sieves*—~~50-mm (2-in.);~~ 19.0-mm ($\frac{3}{4}$ -in.), and 4.75-mm (No. 4) sieves conforming to the requirements of ASTM E11.
- 3.8. *Mixing Tools*—Miscellaneous tools such as mixing pan, spoon, trowel, spatula, etc., or a suitable mechanical device for thoroughly mixing the sample of soil with increments of water.
- 3.9. *Containers*—Suitable containers made of material resistant to corrosion and not subject to change in mass or disintegration on repeated heating and cooling. Containers shall have close-fitting lids to prevent loss of moisture from samples before initial mass determination and to prevent absorption of moisture from the atmosphere following drying and before final mass determination. One container is needed for each moisture content determination.

Commented [JK1]: Delete and remove Sieve size 50mm (2-in) from Note 5 section 3.7 specifications. Sieves sizes for T-99 method 19.0(0.75mm), and 4.75 (No 4) shall be applied.

METHOD A

4. SAMPLE

- 4.1. Obtain a representative sample. This sample must be large enough that when the oversized (retained on the 4.75-mm [No. 4] sieve) particles are removed 3 kg (7 lb) or more of the sample remains.
- 4.2. Dry the sample until it becomes friable under a trowel. Drying may be in air or by use of a drying apparatus that is maintained at a temperature not exceeding 60°C (140°F). Thoroughly break up the aggregations in such a manner as to avoid reducing the natural size of individual particles.
- 4.3. Sieve the soil over the 4.75-mm (No. 4) sieve. When the sample has oversized particles, particles retained on the 4.75-mm (No. 4) sieve, refer to the Annex A1.

Standard Method of Test for

Moisture-Density Relations of Soils
Using a 4.54-kg (10-lb) Rammer and
a 457-mm (18-in.) Drop

AASHTO Designation: T 180-15



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

- 3.2.3. *Rammer Face*—The circular face rammer shall be used but a sector face rammer may be used as an alternative provided the report shall indicate type of face used other than the 50.8-mm (2-in.) circular face, and it shall have an area equal to that of the circular face rammer.
- 3.3. *Sample Extruder (for Solid-Walled Molds Only)*—A jack, lever, frame, or other device adapted for the purpose of extruding compacted specimen from the mold.
- 3.4. *Balances and Scales*—A balance or scale conforming to the requirements of M 231, Class G 5. Also, a balance conforming to the requirements of M 231, Class G 2.
Note 4—The capacity of the metric balance or scale should be approximately 11.5 kg when used to determine the mass of the 152-mm (6-in.) mold and compacted, moist soil; however, when the 102-mm (4-in.) mold is used, a balance or scale of lesser capacity than 11.5 kg may be used, if the sensitivity and readability are 1 g.
- 3.5. *Drying Oven*—A thermostatically controlled drying oven capable of maintaining a temperature of $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$) for drying moisture samples.
- 3.6. *Straightedge*—A hardened steel straightedge at least 250 mm (10 in.) in length. It shall have one beveled edge, and at least one longitudinal surface (used for final trimming) shall be plane within 0.1 percent of the length within the portion used for trimming the soil (Note 5).
Note 5—The beveled edge may be used for final trimming if the edge is true within a tolerance of 0.25 mm per 250 mm (0.1 percent) of length; however, with continued use, the cutting edge may become excessively worn and not suitable for trimming the soil to the level of the mold. The straightedge should not be so flexible that trimming the soil surface with the cutting edge will cause a concave soil surface.
- 3.7. ~~Sieves—50-mm (2-in.),~~ 19.0-mm (0.75-in.), and 4.75-mm (No. 4) sieves conforming to the requirements of E11.
- 3.8. *Mixing Tools*—Miscellaneous tools such as mixing pan, spoon, trowel, spatula, etc., or a suitable mechanical device for thoroughly mixing the sample of soil with increments of water.
- 3.9. *Containers*—Suitable containers made of material resistant to corrosion and not subject to change in mass or disintegration on repeated heating and cooling. Containers shall have close-fitting lids to prevent loss of moisture from samples before initial mass determination and to prevent absorption of moisture from the atmosphere following drying and before final mass determination. One container is needed for each moisture content determination.

Commented [JK1]: Delete and remove Sieve Size 50mm (2-in) from Note 5- section 3.7.specifications. Sieves sizes for T-180 method 19.0mm (0.75-in), and 4.75-mm (No. 4) shall be applied.

Commented [JK2]:

METHOD A

4. SAMPLE

- 4.1. Obtain a representative sample. This sample must be large enough that when the oversized (retained on the 4.75-mm (No. 4) sieve) particles are removed 3 kg (7 lb) or more of the sample remains.
- 4.2. Dry the sample until it becomes friable under a trowel. Drying may be in air or by use of a drying apparatus that is maintained at a temperature not exceeding 60°C (140°F). Thoroughly break up the aggregation in such a manner as to avoid reducing the natural size of individual particles.
- 4.3. Sieve the soil over the 4.75-mm (No. 4) sieve. When the sample has oversized particles, particles retained on the 4.75-mm (No. 4) sieve, refer to the Annex A1. Reduce the sample, to a mass of 3 kg (7 lb) or more in accordance with T 248.