

Date Issued: March 29, 2016

Mr. John Thomas
Quality Control/IA Branch Manager
Oklahoma Department of Transportation
200 N.E. 21st Street
Materials Division
Oklahoma City, Oklahoma 73105-3204

Subject: AMRL On-Site Assessment of Materials Testing Laboratory

Dear Mr. Thomas:

The following is a confirmatory report on Assessment No. 21781, which was completed in your testing laboratory in Oklahoma City, Oklahoma on March 18, 2016, by Jon McCabe, a representative of the AASHTO Materials Reference Laboratory (AMRL). An examination of the Asphalt Binder, Emulsified Asphalt, Asphalt Mixture, Soil, Aggregate and Iron and Steel testing facilities was conducted during this assessment. In addition, the quality system of the laboratory was evaluated based on the criteria specified in AASHTO Standard Practice R18.

This report is also available to you in PDF format on the AMRL website, www.amrl.net, if your laboratory has registered for the site. Please contact us if you have any questions about registering for the website.

This letter and the accompanying report provide written evidence that your laboratory has been assessed. It is requested that this report not be used for advertising, publication, or promotional purposes.

Sincerely,



Maria Knake
Program Manager, AMRL Laboratory Assessment Program
AASHTO Materials Reference Laboratory

Enclosure

REPORT ON MATERIALS TESTING LABORATORY ASSESSMENT:

**Oklahoma Department of Transportation
200 N.E. 21st Street
Materials Division
Oklahoma City, Oklahoma 73105-3204**

AMRL Assessor: **Jon McCabe**
Assessment Number: **21781**
Date of Assessment: **March 18, 2016**

GENERAL INFORMATION

The assessment covered by this report included a review of the Asphalt Binder, Emulsified Asphalt, Asphalt Mixture, Soil, Aggregate and Iron and Steel testing facilities. In addition, an examination of the laboratory's Quality System based on the criteria specified in AASHTO Standard Practice R18 was performed.

This report contains a "Summary of Findings" table for each of the areas examined during the assessment. A "Findings" section follows each "Summary of Findings" table, which describes deviations from specification requirements (nonconformities), states specific observations, and notes other relevant matters.

AMRL applied the most recent versions of AASHTO, ASTM or other governing standards available at the time of the assessment. At the conclusion of the assessment, the assessor presented a preliminary report summarizing the findings to the laboratory staff. The findings presented in this final report may vary slightly from those included in the preliminary report.

ASSESSMENT FINDINGS

Findings in this report are classified as **nonconformities**, **observations**, or **informational**. Definitions for these terms are provided below.

- **Nonconformities:** A finding that indicates policy or practice contrary to the requirements of applicable standards or documented quality system procedures.
- **Observations:** (1) A technically-related finding that is not likely to affect the ability of the laboratory to produce valid and accurate test results; (2) A minor failure in some part of the organization's quality management system, such as a single observed lapse in following one procedure or the lack of information required on a record. *NOTE: Observations are required to be addressed internally by the laboratory. Repeat observations can result in a nonconformity.*
- **Informational:** (1) Specific technical information provided for informational purposes only. (2) Information about pending or anticipated changes to test standards, AASHTO R 18, and the AAP Procedures Manual.

RESOLUTION OF FINDINGS

Resolving Nonconformities

Laboratories seeking AASHTO accreditation or wishing to maintain their accreditation status must resolve all findings labeled as "Nonconformities" within 90 calendar days of the issuance of this final report. The responses must include a description of the corrective action taken and substantiating evidence, such as records; copies of newly prepared or revised documents; equipment packing slips; calibration, standardization, and check records; and photographs. A **root cause analysis** may be required to resolve nonconformities. Repeat nonconformities will require more extensive responses.

RESOLUTION OF FINDINGS (CONT'D)

Corrective Action of Nonconformities and Root Cause Analysis

Resolving nonconformities requires corrective action as follows: (1) Take immediate interim action to isolate the effects of the problem, (2) Take immediate action to correct the problem, (3) Investigate the *root cause* of the problem, if needed, and (4) Implement permanent corrective action to prevent recurrence of the problem.

Note: Root cause analysis can be the most difficult and most important part of the corrective action process. Root cause analysis attempts to determine why the nonconformity occurred in the first place. Its focus is "Why did this happen?" Potential causes could include: insufficient staff training and skills; vague policies and procedures; inadequate frequencies for calibrating or checking equipment; and human error.

If more than 90 calendar days are needed to resolve a nonconformity, your laboratory must provide AMRL with a written plan for resolving the nonconformity including an estimated completion date and any evidence of action taken, such as equipment purchase orders. Plans for future resolution of nonconformities will be reviewed and may result in accreditation being granted, denied, suspended, or revoked. If your laboratory does not resolve a nonconformity within 180 calendar days of the issuance of the final report, and desires to maintain its accreditation, an additional on-site assessment may be required.

Resolving Observations

Laboratories are not required to provide written documentation to AMRL describing action taken to address findings identified as "Observations." The laboratory should, however, take necessary corrective action to address the observation to prevent possible recurrence. Repeat observations may result in nonconformities.

Resolving Informational Findings

Laboratories are not required to provide written documentation to AMRL describing action taken to address findings identified as "Informational."

For a complete explanation of the AASHTO Accreditation Program policies and procedures, please see the [Procedures Manual](#) located at www.amrl.net.

SUBMITTING RESPONSES TO FINDINGS

To respond to nonconformities contained in this report, log in to www.amrl.net using your laboratory's credentials and select the "My Tab" option at the top of the page. Select the "View My Accreditation Events" link at the top of the left-hand column and select the Accreditation Event that corresponds to the report number as issued in this report. Please follow the instructions included on this web page to submit responses to the nonconformities.

CONTACT INFORMATION

For general questions about the assessment program, please use the following contact information:

Contact Information		
AMRL 4441 Buckeystown Pike Suite A Frederick, MD 21704-7507	Fax: 240-436-4899 Phone: 240-436-4900	Email: aap@amrl.net

Laboratories Seeking AASHTO Accreditation

If your laboratory is not accredited by AASHTO, but desires AASHTO accreditation, your laboratory may obtain accreditation based on an application submitted subsequent to an on-site assessment provided: (1) the on-site assessment includes an AASHTO R 18 quality management system review of the applicable field(s), (2) the application is submitted within 90 calendar days of the date of issuance of this final report, and (3) nonconformities are resolved as described previously.

**SUMMARY OF FINDINGS
GENERAL APPARATUS**

The table below indicates the Standards observed and discussed during the assessment, and the conformance of the laboratory to specified requirements. A "-" in the Status columns indicates that this item was not included.

ITEM EVALUATED	STATUS
Mechanical Sieving Apparatus	Satisfactory
Ovens	Satisfactory
Literature	Satisfactory
Sample Reducing Apparatus	Satisfactory
Sieves	Satisfactory
Thermometers	Satisfactory
General Purpose Balances	Satisfactory

FINDINGS

None.

SUMMARY OF FINDINGS (ASPHALT BINDER)

The table below indicates the Standard test methods observed and discussed during the assessment, and the conformance of the laboratory to specified equipment and procedural requirements. A " - - - - -" in the Status columns indicates that the laboratory elected not to include this item as part of the assessment.

Test Method	Designation	AASHTO/Other	ASTM
Pressurized Aging Vessel (PAV)	R28 / D6521	See Finding (a)	-----
Solubility of Asphalt Materials in Trichloroethylene	T44 / D2042	Satisfactory	-----
Flash Point by Cleveland Open Cup	T48 / D92	See Finding (b)	-----
Penetration of Bituminous Materials	T49 / D5	See Finding (c)	-----
Float Test for Bituminous Materials	T50 / D139	Satisfactory	-----
Ductility of Bituminous Materials	T51 / D113	Satisfactory	-----
Softening Point of Bitumen (Ring-and-Ball)	T53 / D36	Satisfactory	-----
Distillation of Cut-Back Asphaltic Products	T78 / D402	Satisfactory	-----
Flash Point With Tag Open-Cup Apparatus	T79 / D3143	Satisfactory	-----
Kinematic Viscosity of Asphalts	T201 / D2170	See Finding (d)	-----
Viscosity by Vacuum Capillary	T202 / D2171	See Finding (e)	-----
Specific Gravity of Asphalt Cement	T228 / D70	See Finding (f)	-----
Rolling Thin-Film Oven Test	T240 / D2872	Satisfactory	-----
Specific Gravity of Liquid Asphalts by Hydrometer	T295 / D3142	Satisfactory	-----
Elastic Recovery Test	T301 / D6084	-----	Satisfactory
Bending Beam Rheometer (BBR)	T313 / D6648	See Finding (g)	-----
Dynamic Shear Rheometer (DSR)	T315 / D7175	Satisfactory	-----
Viscosity of Asphalt Binder Using Rotational Viscometer	T316 / D4402	Satisfactory	-----
Multiple Stress Creep and Recovery (MSCR)	T350 / D7405	Satisfactory	-----

FINDINGS**(a) Pressurized Aging Vessel (PAV)**AASHTO R28-2012**Observation**

The material in the pans was not stirred gently to assist in the removal of air bubbles while it remained in the oven after it was removed from the PAV.

(b) Flash Point by Cleveland Open CupAASHTO T48-2006**Nonconformity**

The initial rate of temperature rise of the sample was not maintained at 10 to 20°C (18 to 36°F) [ASTM: 5 to 17°C (9 to 30°F)] per minute. The initial rate of temperature rise varied from 1.2 to 18.2°C per minute.

(c) Penetration of Bituminous MaterialsAASHTO T49-2015**Nonconformity**

The water bath presented was not equipped with a perforated shelf at least 50 mm from the bottom of the bath and at least 100 mm below the liquid level in the bath.

(d) Kinematic Viscosity of AsphaltsAASHTO T201-2015**Informational**

The laboratory only tests cutback asphalts using the kinematic viscosity test.

(e) Viscosity by Vacuum CapillaryAASHTO T202-2015**Nonconformity**

The vacuum system presented did not maintain a vacuum of 300.0 ± 0.5 mm Hg. The pressure fluctuated between 299.5 and 301.5 mm Hg during the test.

(f) Specific Gravity of Asphalt CementAASHTO T228-2009**Nonconformity**

The top of the pycnometer was not immersed at least 40 mm below the surface of the water in the beaker. The top of the pycnometer was immersed 35 mm below the surface of the water.

(g) Bending Beam Rheometer (BBR)AASHTO T313-2012**Nonconformity**

During the verification of the temperature, the thermometer was not immersed close to the thermal detector. The thermometer was immersed in the center of the bath.

Observations

The thicknesses of the two spacers presented were not measured to verify that they did not vary from each other by more than 0.05 mm.

Of the 48 spacers presented, 2 did not have a thickness of 6.35 ± 0.05 mm.

SUMMARY OF FINDINGS (EMULSIFIED ASPHALT)

The table below indicates the Standard test methods observed and discussed during the assessment, and the conformance of the laboratory to specified equipment and procedural requirements. A " - - - - -" in the Status columns indicates that the laboratory elected not to include this item as part of the assessment.

Test Method	Designation	AASHTO/Other	ASTM
Settlement and Storage Stability	T59 / D6930	See Finding (a)	-----
Sieve Test	T59 / D6933	Satisfactory	-----
Residue by Evaporation	T59 / D6934	Satisfactory	-----
Particle Charge	T59 / D7402	Satisfactory	-----
Saybolt Viscosity at 25°C (77°F)	T59 / D7496-D88	See Finding (b)	-----
Saybolt Viscosity at 50°C (122°F)	T59 / D7496-D88	See Finding (c)	-----

FINDINGS**(a) Settlement and Storage Stability**AASHTO T59-2015**Nonconformity**

The 55 ml of remaining sample was not stirred in the cylinder then poured into a beaker. The sample was poured into a beaker then stirred.

(b) Saybolt Viscosity at 25°C (77°F)AASHTO T59-2015**Informational**

The correction factor for one of the four viscometer tubes presented was greater than one percent. This viscometer should not be used for referee testing.

(c) Saybolt Viscosity at 50°C (122°F)AASHTO T59-2015**Informational**

The correction factor for one of the four viscometer tubes presented was greater than one percent. This viscometer should not be used for referee testing.

SUMMARY OF FINDINGS (ASPHALT MIXTURE)

The table below indicates the Standard test methods observed and discussed during the assessment, and the conformance of the laboratory to specified equipment and procedural requirements. A "-----" in the Status columns indicates that the laboratory elected not to include this item as part of the assessment.

Test Method	Designation	AASHTO/Other	ASTM
Reducing Samples of Hot-Mix Asphalt	R47 / -----	Satisfactory	-----
Mechanical Analysis of HMA	T30 / D5444	Satisfactory	-----
Quantitative Extraction of Asphalt Binder from HMA	T164 / D2172	Satisfactory	-----
Bulk Specific Gravity of Compacted Hot Mix Asphalt	T166 / D2726	Satisfactory	-----
Maximum Specific Gravity of Hot Mix Asphalt Paving Mixtures	T209 / D2041	Satisfactory	-----
Percent Air Voids in Bituminous Paving Mixtures	T269 / D3203	Satisfactory	-----
Moisture-Induced Damage of HMA (Tensile Strength Ratio)	T283 / D4867	Satisfactory	-----
Asphalt Content by Ignition Method	T308 / D6307	Satisfactory	-----
Hot Mix Asphalt Superpave Gyratory Compactor	T312 / D6925	Satisfactory	-----
Hamburg Wheel-Track Test	T324 / -----	Satisfactory	-----
Moisture Content of HMA by Oven	T329 / -----	Satisfactory	-----
Bulk Specific Gravity Using Vacuum Sealing Method	T331 / D6752	Satisfactory	-----

FINDINGS

None.

SUMMARY OF FINDINGS (SOIL)

The table below indicates the Standard test methods observed and discussed during the assessment, and the conformance of the laboratory to specified equipment and procedural requirements. A "-----" in the Status columns indicates that the laboratory elected not to include this item as part of the assessment.

Test Method	Designation	AASHTO/Other	ASTM
Dry Preparation of Samples	R58 / D421	Satisfactory	Satisfactory
Particle Size Analysis of Soils by Hydrometer	T88 / D422	See Finding (a)	See Finding (a)
Liquid Limit of Soils (Atterberg Limits)	T89 / D4318	See Finding (b)	See Finding (b)
Plastic Limit of Soils (Atterberg Limits)	T90 / D4318	Satisfactory	Satisfactory
Moisture-Density (Proctor) of Soils, Standard Effort	T99 / D698	Satisfactory	Satisfactory
Specific Gravity of Soils	T100 / D854	Satisfactory	-----
Sand Equivalent Test	T176 / D2419	Satisfactory	Satisfactory
Moisture-Density (Proctor) of Soils, Modified Effort	T180 / D1557	Satisfactory	Satisfactory
California Bearing Ratio	T193 / D1883	Satisfactory	See Finding (c)
Unconfined Compressive Strength of Soil	T208 / D2166	Satisfactory	Satisfactory
One-Dimensional Consolidation of Soils	T216 / D2435	Satisfactory	Satisfactory
Oversize Particle Correction	T224 / D4718	Satisfactory	-----
Direct Shear of Soils	T236 / D3080	Satisfactory	-----
Moisture Content of Soils	T265 / D2216	Satisfactory	Satisfactory
Nuclear Density and Moisture Gauge for Soil	T310 / D6938	Satisfactory	Satisfactory
Classification of Soils (Unified System)	----- / D2487	-----	Satisfactory
Description and Identification of Soils (Visual-Manual)	----- / D2488	-----	Satisfactory
Slake Durability of Shales and Weak Rocks	----- / D4644	-----	Satisfactory
Shrinkage Factors of Soils by Wax Method	----- / D4943	-----	Satisfactory
Point Load Strength Index of Rock	----- / D5731	-----	Satisfactory

FINDINGS**(a) Particle Size Analysis of Soils by Hydrometer**

AASHTO T88-2013 / ASTM D422-1963(2007)

Nonconformities

After dispersing the specimen, all of the material retained in the dispersion cup and on the stirring paddle of the mechanical stirring apparatus was not rinsed into the sedimentation cylinder. Some material remained in the dispersion cup. Material was also lost during transfer.

The hydrometer reading recorded as the 2-minute reading was taken after the soil had been in suspension for 3 minutes. Consequently, each of the hydrometer readings was taken 1 minute after the recorded time.

ASTM D422-1963(2007)

Nonconformity

The sedimentation cylinder was not placed in the water bath between the 2 and 5-minute hydrometer readings. The cylinder was placed in the water bath prior to the 2-minute hydrometer reading.

(b) Liquid Limit of Soils (Atterberg Limits)

AASHTO T89-2013 / ASTM D4318-2010

Nonconformity

Only one moisture content sample was taken. The second groove closure was the only moisture sample obtained.

(c) California Bearing Ratio

ASTM D1883-2014

Observation

Following testing, the depth of the piston penetration into the compacted specimen was not measured with a ruler and compared to the depth determined using the penetration gauge.

SUMMARY OF FINDINGS (AGGREGATE)

The table below indicates the Standard test methods observed and discussed during the assessment, and the conformance of the laboratory to specified equipment and procedural requirements. A "-----" in the Status columns indicates that the laboratory elected not to include this item as part of the assessment.

Test Method	Designation	AASHTO/Other	ASTM
Sampling Aggregate	T2 / D75	Satisfactory	-----
Material Finer Than 75- μ m (No. 200) Sieve	T11 / C117	Satisfactory	-----
Bulk Density and Voids in Aggregate	T19 / C29	Satisfactory	-----
Organic Impurities in Sands	T21 / C40	Satisfactory	-----
Sieve Analysis of Aggregates	T27 / C136	Satisfactory	-----
Fine Aggregate Specific Gravity and Absorption	T84 / C128	Satisfactory	-----
Coarse Aggregate Specific Gravity and Absorption	T85 / C127	Satisfactory	-----
Abrasion of Coarse Aggregate	T96 / C131	Satisfactory	-----
Clay Lumps and Friable Particle Percentage	T112 / C142	Satisfactory	-----
Sand Equivalent Test	T176 / D2419	Satisfactory	-----
Aggregate Durability Index	T210 / D3744	Satisfactory	-----
Reducing Samples of Aggregate to Test Size	T248 / C702	Satisfactory	-----
Moisture Content of Aggregate by Oven Drying	T255 / C566	Satisfactory	-----
Uncompacted Void Content of Fine Aggregate	T304 / C1252	Satisfactory	-----
Resistance to Abrasion by Micro-Deval (Coarse Aggregate)	T327 / D6928	Satisfactory	-----
Fractured Particles in Coarse Aggregate	T335 / D5821	-----	Satisfactory
Flat, Elongated, or Flat and Elongated Particles	----- / D4791	-----	Satisfactory

FINDINGS

None.

SUMMARY OF FINDINGS (IRON AND STEEL)

The table below indicates the Standard test methods observed and discussed during the assessment, and the conformance of the laboratory to specified equipment and procedural requirements. A "-----" in the Status columns indicates that the laboratory elected not to include this item as part of the assessment.

Test Method	Designation	AASHTO/Other	ASTM
Zinc Coatings on Iron and Steel: Thickness of Zinc (Stripping)	M111-T65 / A123-A90	Satisfactory	-----
Zinc Coatings on Iron and Steel: Thickness of Zinc (Magnetic)	M111 / A123-E376	Satisfactory	-----
Welded Plain Steel Wire: Weld Shear	M55 / A1064	Satisfactory	-----
Welded Plain Steel Wire: Tension (Ultimate Tensile Strength)	M55-T244 / A1064-A370	Satisfactory	-----
Welded Deformed Steel Wire: Weld Shear	M221 / A1064	Satisfactory	-----
Welded Deformed Steel Wire: Tension (Ultimate Tensile Strength)	M221-T244 / A1064-A370	Satisfactory	-----
Deformed Steel Wire: Tension (Ultimate Tensile Strength)	M225-T244 / A1064-A370	Satisfactory	-----
Plain Steel Wire: Tension (Ultimate Tensile Strength)	M32-T244 / A1064-A370	Satisfactory	-----
Carbon-Steel Bars, Deformed and Plain: Tension (Yield Strength)	M31-T244 / A615-A370	Satisfactory	-----
Carbon-Steel Bars, Deformed and Plain: Tension (Ultimate Tensile Strength)	M31-T244 / A615-A370	Satisfactory	-----
Carbon-Steel Bars, Deformed and Plain: Tension (Elongation)	M31-T244 / A615-A370	Satisfactory	-----

FINDINGS

None.

**SUMMARY OF FINDINGS
QUALITY SYSTEM CRITERIA**

The table below indicates the Standards observed and discussed during the assessment, and the conformance of the laboratory to specified requirements. A "-----" in the Status columns indicates that this item was not included.

Standard Practice R18 Management Requirements

ITEM EVALUATED	STATUS
Quality Management System	See Finding (a)
Document Control	Satisfactory
Organization	Satisfactory
Staff	Satisfactory
Technician Training and Evaluation	Satisfactory
Internal Audits	Satisfactory
Corrective Action	Satisfactory
Records Retention	Satisfactory

Standard Practice R18 Technical Requirements

ITEM EVALUATED	STATUS
Equipment	Satisfactory
Equipment Calibration, Standardization, Check, and Maintenance Records	See Finding (b)
Sample Management	Satisfactory
Test Records and Reports	Satisfactory
Subcontracting	Satisfactory
Assuring the Quality of Results	Satisfactory

Additional Quality System Evaluations

ITEM EVALUATED	STATUS
ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates	-----
ASTM D3666 - Standard Specification for Agencies Testing and Inspecting Road and Paving Materials	-----
ASTM D3740 - Standard Practice for Agencies Testing Soil and Rock	-----
ASTM D4561 - Quality Control Systems for Organizations Producing and Applying Bituminous Paving Materials	-----
ASTM E329 - Standard Specification for Agencies Testing Materials Used in Construction	-----

FINDINGS**(a) Quality Management System*****Informational***

This quality management system (QMS) evaluation was limited to a review of (1) all records associated with the implementation of the QMS and (2) any new requirements for policies and procedures since the last full evaluation of the laboratory's QMS, Report No. 649R, in March 2014. Any findings are included in the applicable sections below.

(b) Equipment Calibration, Standardization, Check, and Maintenance Records***Observation***

The calibration, standardization, or check records presented for bending beam rheometer did not include detailed results (Section 6.1.5.1). The records did not include a check of the 2 gram masses. (This finding was resolved during the assessment. The 2 gram masses were checked and a record was made.)

CLOSURE

The findings upon which this report is based were discussed with the laboratory personnel during the course of the on-site assessment. At the conclusion of the assessment, a preliminary report summarizing these comments was presented to the laboratory staff, and all departures from applicable standard test methods and specifications were discussed in detail.

It is recommended that this report be compared with the report of the preceding assessment that was made in this laboratory in May 2014.

AASHTO MATERIALS REFERENCE LABORATORY

A handwritten signature in black ink, appearing to read 'Jon McCabe', with a stylized, cursive script.

Jon McCabe
Assessor