



WSDOT Standard Practice QC 3

Quality System Laboratory Review

1. Scope

This standard specifies requirements and procedures for the review of WSDOT Regional Materials Laboratory and for Private Laboratories by the Quality Systems Laboratory Review Team. The on-site laboratory review shall include the following elements:

- Review of the testing facility.
- Review of the equipment calibration/verification records.
- Review of the testing technician's training records.
- Physical inspection of the equipment used to perform tests.
- Observation of technician performing the test procedure.
- Review of test reports and calculations.

2. Referenced Documents

2.1 AASHTO Standards

- R 18 Establishing and Implementing a Quality System for Construction Materials Testing Laboratories
- R 61 Establishing Requirements for and Performing Equipment Calibrations, Standardizations, and Checks

2.2 WSDOT Standards

Materials Manual M 46-01

Construction Manual M 41-01

Standard Specifications for Road, Bridge, and Municipal Construction M 41-10

3. Terminology

- 3.1 AASHTO – American Association of State Highway and Transportation Officials
- 3.2 ASTM – American Society for Testing and Materials
- 3.3 Calibration – A process that establishes the relationship (traceability) between the results of a measurement instrument, measurement system, or material measure and the corresponding values assigned to a reference standard (Note 1).

Note 1: The definition for calibration and the following definitions for check, standardization, traceability, uncertainty, and verification of calibration are based on the definitions in R 61.

- 3.4 Check – A specific type of inspection and/or measurement performed on equipment and materials to indicate compliance or otherwise with stated criteria.

- 3.5 Standardization – A process that determines (1) the correction to be applied to the result of a measuring instrument, measuring system, material measure, or reference material when its values are compared to the values realized by standards; or (2) the adjustment to be applied to a piece of equipment when its performance is compared with that of an accepted standard or process.
- 3.6 WSDOT – Washington State Department of Transportation

4. Significance and Use

- 4.1 This standard specifies procedures for reviewing laboratories for the purpose of determining the capability of the facility and its personnel to perform the necessary acceptance testing for WSDOT.

5. Laboratory Requirements

5.1 Facility and Equipment

- 5.1.1 Laboratory facilities shall adequately house and allow proper operation of all required equipment in accordance with the applicable test procedures.
- 5.1.2 The temperature and humidity of the laboratory shall meet the requirements of all test procedures performed in the laboratory.
- 5.1.3 The testing areas shall be clean and free of clutter.
- 5.1.4 The laboratory shall use testing equipment that meets the requirements of each test procedure.
- 5.1.5 Testing equipment for private laboratories and the State Materials Laboratory shall be calibrated/standardized/checked in accordance with the test procedure, appropriate sections of AASHTO R 18 and AASHTO R 61. WSDOT region and field laboratories testing equipment shall be calibrated/standardized/checked in accordance with the test procedure and Section 9-5 of the *Construction Manual* M 41-01.
- 5.1.6 Documentation of equipment calibration/standardization/check shall be maintained and available on-site during laboratory review.
- 5.1.7 Safety equipment will be available and maintained in proper working order.

5.2 Tester Training and Records

- 5.2.1 The laboratory shall use personnel qualified in accordance with the appropriate sections of AASHTO R 18. WSDOT region and field laboratory personnel shall be qualified in accordance with Section 9-5 of the *Construction Manual* M 41-01.
- 5.2.2 The laboratory shall maintain records of training for each tester.
- 5.2.3 A tester's competency for performing a test procedure shall be evaluated using a checklist relating to the test procedure. The checklist shall be filed in the tester's training record.

Note: Private laboratories may use test procedure checklists from the *Materials Manual*, or may develop their own checklists similar to those found in the *Materials Manual*.

- 5.2.4 Testers for private laboratories shall be reviewed for qualification at the frequency stated in the *Laboratory Quality Systems Manual* (LQSM).

5.3 Manuals and Records

- 5.3.1 Private laboratories shall have an up-to-date LQSM meeting the requirements of AASHTO R 18 and approved by the State Materials Engineer.
- 5.3.2 All private laboratories shall have an up-to-date copy of the LQSM on-site and available to all testers.
- 5.3.3 Each tester must have access to the most current copy of the AASHTO, ASTM, and *Materials Manual*. WSDOT testers must have access to the most current copy of the *Construction Manual* M 41-01.
- 5.3.4 If an earlier version of the *Materials Manual* or *Construction Manual* M 41-01 is required by contract, the laboratory shall maintain an unaltered version of the required manual.
- 5.3.5 A file of MSDS sheets must be maintained in the laboratory and must be available to all testers.
- 5.3.6 Test records are required to contain sufficient information to permit verification of any test report (original observations, calculations, derived data, and identification of personnel involved in the sampling and testing).
- 5.3.7 Amendments to reports must be made in the manner stated in the LQSM.
- 5.3.8 The laboratory shall define the process used to ensure testers are performing the correct testing procedure according to the clients' contractual requirements (i.e., AASHTO, ASTM, or WSDOT test procedure as required by the contract).
- 5.3.9 Test reports are required to contain the following information:
 - Name and address of the testing laboratory.
 - Name and address of the client or identification of the project.
 - Date of receipt of the test sample.
 - Date of test performance.
 - Identification of the standard test method used and notation of all known deviations from the test method.
 - Test results and specification of the material.
 - Name of tester performing the test.
 - Date report was issued.
 - Name of person accepting technical responsibility for test report.

6. Sampling

- 6.1 Test samples required for observation of test procedures shall be obtained by:

T 2 WSDOT FOP for AASHTO for Soils and Aggregate

T 168 WSDOT FOP for WAQTC for Hot Mix Asphalt

TM 2 WSDOT FOP for WAQTC for Concrete

7. Sample Preparation Requirements

- 7.1 Prior to the performance portion of the laboratory review, for the testing being performed, samples are required to be prepared as shown in [Table 1](#).

Test Procedure	Test	Required Preparation
Aggregate Tests		
FOP for AASHTO T 335	Fracture	Material washed, graded, and ready for counting fracture.
FOP for WAQTC T 27/T 11	Sieve Analysis of Fine and Coarse Aggregates	<ol style="list-style-type: none"> 1. Split or quarter proper amount of the original sample and dry to constant weight. 2. Have a split of the original sample that has been washed and dried, ready for sieving. 3. Retain all weights in order to do calculations.
FOP for AASHTO T 176	Sand Equivalent Test	<ol style="list-style-type: none"> 1. Have a sample (approximately 1000 g) of #4 minus material prepared for the moisture conditioning process (do not moisten). 2. Have two properly prepared tins ready for introduction into the SE tube.
FOP for AASHTO T 248	Reducing Sample	30 lbs dry material.
FOP for AASHTO T 304	Uncompacted Voids	<ol style="list-style-type: none"> 1. Have sample washed and dried. 2. Sample separated into individual size fractions.
Concrete Tests		
FOP for AASHTO T 106	Compressive Strength	Three mortar cubes.
FOP for AASHTO T 22	Compressive Strength	Two cylinders.
FOP for AASHTO T 231	Capping Cylinder	<ol style="list-style-type: none"> 1. Have capping sulfur compound heated and ready for capping. 2. Have two cylinders available for capping (can be the cylinders for T 22).
WSDOT T 810	Density of Pavement Core	Have a drilled pavement core available.
WSDOT T 812	Length of Drilled PCC Core	May use the core from T 810.
Soils Tests		
WSDOT T 417*	Resistivity and pH	<ol style="list-style-type: none"> 1. Prepare a 100 g sample of natural #8 minus material for the pH test. 2. Prepare the soil/water slurry a minimum of 1 hour prior to test review. 3. Prepare a sample of #8 minus material that is four times the volume of the soil box for the resistivity test. 4. Add 10 percent by weight of water to the sample and allow it to stand a minimum of 12 hours in a waterproof container.
AASHTO T 84*	Specific Gravity and Absorption Fine Agg.	Prepare sample to step 6.1.2 of the procedure.
AASHTO T 85*	Specific Gravity and Absorption Coarse Agg.	Prepare sample to step 8.2 of the procedure.
AASHTO T 87*	Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test	500 g of soil aggregate air dried.
AASHTO T 88*	Particle Size Analysis	No preparation.

Sample Preparation Requirements

Table 1

Test Procedure	Test	Required Preparation
AASHTO T 100*	Specific Gravity Soils	No preparation.
AASHTO T 255	Moisture Content	No preparation.
AASHTO T 265	Moisture Content	No preparation.
FOP for AASHTO T 99/T 180	Proctor	Prepare five representative samples of #4 or 3/4" material at approximately 2 percent moisture already added to each sample starting at approximately 4 percent below optimum moisture of the material. Store in sealed containers.
WSDOT T 606	Maximum Density Curve	<ol style="list-style-type: none"> 1. Dry and split a sample of material into coarse and fine material. 2. Prepare fine material for Test 1. 3. Prepare coarse material for either Test 2, Procedure 1 or Test 2, Procedure 2.
Hot Mix Asphalt Tests (Have HMA samples ready on the first day of review.)		
WSDOT T 712*	Reducing Sample	An adequate amount of HMA to perform all the testing required. Heat sample and have it ready to reduce. Required to split material from sample for T 308, T 312, T 329, T 209.
FOP for AASHTO T 166*	Bulk Specific Gravity	A room temperature compacted sample must be provided for this test. A gyratory sample or a core sample will suffice.
WSDOT SOP 724*	Preparation of Aggregates	Representative aggregate from stockpiles used in JMF, dried to a constant weight.
WSDOT SOP 726*	Mixing Procedure HMA	<p>Binder used in JMF mix design heated to mixing temperature as recommended by binder supplier (typically one quart container).</p> <p>Aggregate representative of JMF sample size based on class of HMA heated to mixing temperature as recommended by binder supplier.</p>

*WSDOT Laboratories only unless review of a private laboratory is requested by the project office.

Sample Preparation Requirements

Table 1 (continued)

8. Performance of Test Procedure

- 8.1 All technicians must be current in their qualifications.
- 8.2 The laboratory review team will evaluate the technician's testing proficiency using an approved WSDOT checklist.
- 8.3 All equipment, used during the evaluation of the technician's proficiency, must be operational and have a current calibration sticker on the equipment.
- 8.4 When the test is complete, the reviewer will go over the checklist with the tester and point out any deficiencies that occurred during the performance of the test procedure.

9. Termination of Review

- 9.1 A laboratory review team member may choose to terminate the review of a procedure for the following reasons:
 - 9.1.1 Equipment is non-operational or the wrong equipment is being used.
 - 9.1.2 Tester is not qualified in the test procedure being reviewed.
 - 9.1.3 Tester makes multiple major errors in the performance of the test.
- 9.2 The review of the laboratory may be terminated by the WSDOT Quality Systems Manager for the following reasons:
 - 9.2.1 Facility is not adequate for the test procedures being reviewed.
 - 9.2.2 Two or more testers fail during the proficiency portion of the review.
 - 9.2.3 Documentation of qualification of testers or calibration of equipment is not available for review when team arrives.

10. Failure of Review

- 10.1 Rescheduling a review will require the following wait periods:
 - First Failure – Minimum of one week wait to reschedule.
 - Second Failure – Minimum of one month wait to reschedule.
 - Third Failure – Minimum of one month wait and submittal of corrective action documentation. The documents submitted must state the concerns of the review team and the corrective action taken to solve the problem.

11. Laboratory Review Team Report

- 11.1 The Laboratory Review Team will review the facility, equipment, records, and testers compliance with the established requirements.
- 11.2 The evaluation report will be prepared and sent to the laboratory within 30 days of the completion of the review.
- 11.3 Any items that did not meet the requirements of [Section 5](#) will be written up as “Issues.”
 - 11.3.1 Issues resolved during the review shall be noted as “Issue Resolved No Response” necessary. If a “Resolved No Response Required” issue reoccurs in subsequent evaluations, the issue will be escalated to a “Response Required Issue.”
 - 11.3.2 Issues that were not able to be resolved during the review will be noted as “Response Required Issue.”
- 11.4 During the review, members of the team may make suggestions for improvements to the performance of the test procedure or operation of equipment. These are suggestions only and will be noted in the report as “Observations.” These do not require a response.

12. Response to Report

- 12.1 Once the evaluation report has been received, the laboratory will have 90 days to respond in writing to all “Issues” labeled “Response Required.”
- 12.2 The response must be a detailed explanation stating how the laboratory has resolved the issue and what measures they have taken to prevent this issue from reoccurring in the future.

13. Approval of Laboratory

- 13.1 If the laboratory review report had no issues or the issues are minor and resolved at the time of the review, the laboratory may be approved to perform acceptance, Independent Assurance, or dispute resolution testing.
- 13.2 If the laboratory review contained Response Required Issues, the laboratory may receive a conditional approval until the deficiencies are corrected or the review team may recommend that the laboratory be disapproved for all testing until the deficiencies are corrected to the satisfaction of the WSDOT Quality System Manager.

14. Suspension of Laboratory Approval

- 14.1 Laboratory approvals are subject to satisfactory results from WSDOT evaluations, including Independent Assurance evaluations. If WSDOT determines an Approved Laboratory no longer meets the approval requirements a Notification of Pending Suspension will be sent to the laboratory stating the reason for the suspension.
 - 14.1.1 The following conditions may result in suspension of a laboratory's approval status:
 - a. Failure to supply required information in a timely manner
 - b. Failure to correct deficiencies in a timely manner
 - c. Unsatisfactory performance report by the Independent Assurance Inspector
 - d. Changing the laboratory's physical location without notification to the WSDOT Quality Systems Manager
 - f. Delays in reporting the test data to WSDOT
 - g. Incomplete or inaccurate reporting
 - h. Using unqualified technicians to perform testing
 - i. Using equipment that is not calibrated, standardized or checked in accordance with AASHTO R 18
 - 14.1.2 The laboratory will be given one week to respond to the pending suspension notice with a Letter of Correction, detailing how the suspension issue has been corrected and what measures have been enacted to prevent the issue from reoccurring. The State Materials Engineer will review the Letter of Correction and determine if the corrections are adequate or if a suspension is still required and the duration of the suspension.
 - 14.1.3 A suspended laboratory must resolve all issues to the WSDOT's satisfaction and obtain reinstatement of qualification, prior to being allowed to test materials for a WSDOT project,
- 14.2 Should an approved laboratory be accused of falsifying test data or records the laboratory's approval will be suspended until the charge can be investigated. If found the approved laboratory is found to have falsified test data or records the laboratory will be disqualified from testing for a WSDOT project for a minimum of one year and be subject to further investigation and penalty under state and federal law.

