METHODS OF SAMPLING AND TESTING
MT 602-17
ACCEPTANCE, INDEPENDENT ASSURANCE AND FINAL RECORD SAMPLING

1 SCOPE

1.1 Samples are to be obtained on a random basis for materials specified in MT 601 and in specified quantities as related to yards, tons or other units of measurement.

This test method documents the use of and the rates and frequencies associated with the acceptance of samples, independent assurance of procedures, and final records.

Classes of Samples and Tests: Three classes of samples and tests are required for each project. They are "Acceptance samples and tests," "Independent Assurance samples and tests," and "Final Record samples and tests."

2 REFERENCE DOCUMENTS

ASTM
D5821 Determining the Percentage of Fractured Particles in Coarse Aggregate

AASHTO
T 89 Determining the Liquid Limit of Soils
T 90 Determining the Plastic Limit and Plasticity Index of Soils
T 335 Determining the Percentage of Fracture in Coarse Aggregate

MT Materials Manual
MT 202 Sieve Analysis for Fine and Coarse Aggregate
MT 226 Maximum Acceptable Deviations in Sieve Analysis of IA Samples
MT 601 Materials Sampling, Testing and Acceptance Guide
MT 606 Random Sampling Techniques

3 ACCEPTANCE SAMPLING AND TESTING

Random sampling and testing in accordance with MT 601 to ensure the quality of materials being incorporated or proposed for incorporation into a construction project. Acceptance sampling and testing are the principal means to assure materials and workmanship are in accordance with the contract. The number of samples and the distribution of the locations from which they are taken should be such as to ensure the materials incorporated are acceptable and in accordance with the contract requirements. Sampling and testing frequencies listed are a minimum. As job conditions vary, such as the uniformity of materials at the source, the methods and equipment used, and weather conditions, further sampling and testing can be done. Acceptance sampling and testing may be any of the following:

- Samples of materials witnessed, taken and/or tested by MDT personnel or delegated inspection agency.
- Samples taken and/or tested by the manufacturer or supplier with test results or certificates submitted to the Department.

4 INDEPENDENT ASSURANCE (IA)

Per 23 CFR 637, Independent Assurance Program is defined as activities that are an unbiased and independent evaluation of all the sampling and testing procedures used in the acceptance program. IA results are not used directly for determining the quality and acceptability of the materials and workmanship on a project, but serve as checks on the reliability of the results obtained in project acceptance sampling and testing.

The elements of the Department's IA Program are as follows:

- IA sampling and testing frequencies as established in MT 601
- Prompt comparison and documentation of test results obtained from split sample and

proficiency sample evaluations
- Department established tolerances for the comparison of test results
- Evaluation of testing personnel procedures through observations and results of split samples and proficiency samples
- Testing equipment evaluation using calibration checks, split samples and proficiency samples

4.1 Independent Assurance Comparison (IAC)

Description – IAC tests (also known as split samples) are performed to verify conformance with testing criteria through review of test results on equivalent samples.

Purpose – IAC's are used to eliminate materials and sampling variability from the analysis so only the variability due to the testing procedures and the equipment are evaluated.

Frequency – MT 601 lists the minimum frequencies at which Independent Assurance Comparison samples are taken. These are reviewed and approved by the FHWA.

Responsibility – IAC's are a joint effort between Field Construction technicians, District/Area Materials Lab technicians, and MDT Materials Headquarter technicians. IAC requirements apply to all persons conducting acceptance sampling and testing on behalf of MDT.

Sampling – These samples are taken at random per MT 606 from materials or from construction work in progress and are not necessarily intended to check compliance with specifications. They are taken and tested to provide an independent spot check of the adequacy and effectiveness of the results obtained in acceptance sampling and testing. If differences are discovered between acceptance samples and Independent assurance samples, it must be determined immediately why deviations exist and corrective measures taken to assure proper testing techniques and equipment are being utilized. If independent assurance samples are to accomplish the purpose for which they are intended, they must be the same sample or taken at the same place, by the same method and at the same time as routine acceptance samples.

When an IAC sample is required, the technician performing acceptance testing obtains a sample, performs the initial acceptance test and documents the results. This sample then becomes the IAC sample that will be tested by the District/Area Materials Lab technician or MDT Materials Headquarters technician or both. To maintain the integrity of the sample, it is critical that all materials used for testing (with the exception of the wash sample) be recombined to their original configuration prior to transferring to the next testing facility.

Sampling concrete aggregate shall be done by the District Laboratory Supervisor or a designated representative.

Independent assurance samples are selected by MDT personnel who are not associated with the taking of acceptance samples on the project, or from samples taken for acceptance purposes provided such samples have been taken under their observation and control. Independent assurance samples are to be continuously in the custody or under the observation of properly trained personnel not associated with acceptance sampling until they are shipped or delivered to the District/Area Laboratory or the Materials Bureau for testing.

Testing IAC Samples – The IAC sample must be taken to the laboratory and tested without delay. The results obtained for each of the required tests are to be delivered promptly to the Project Manager. Results should be compared with acceptance test results obtained on similar material and an evaluation made as to the accuracy of the acceptance sampling and testing. Project personnel should be notified if improved procedures, closer inspection and control, or possible corrective action are required.

Controlling test results – IAC results are not used directly for determining the quality and acceptability of the materials on a project. Acceptance test results take precedence in the event of conflicting results unless extenuating circumstances are identified.

Tolerance – Department IAC tolerances are identified per the following table:

MATERIAL CATEGORY	TEST METHOD	REFERENCE DOCUMENT	TOLERANCE
AGGREGATE	MT 202 SIEVE ANALYSIS	MT 226	REFER TO MT 226 FOR ACCEPTABLE DEVIATION
AGGREGATE SURFACING	MT 202 SIEVE ANALYSIS	MT 226	REFER TO MT 226 FOR ACCEPTABLE DEVIATION
AGGREGATE SURFACING	AASHTO T 89	N/A	MULTILABORATORY RESULTS DIFFER BY MORE THAN 13% OF THEIR MEAN
AGGREGATE SURFACING	AASHTO T 90	N/A	MULTILABORATORY RESULTS DIFFER BY MORE THAN 18% OF THEIR MEAN
AGGREGATE SURFACING	AASHTO T 335	ASTM D5821	MULTILABORATORY RESULTS DIFFER BY MORE THAN 14.7% OF THEIR MEAN

IAC results that are considered unsatisfactory must be investigated by the appropriate District Materials Supervisor to identify the cause and any corrective action needed. Document corrective action taken for the project file with copies sent to the Inspection Operations Supervisor. Unsatisfactory IACs should be brought to the attention of the corresponding Project Manager. Failure to demonstrate the following are typical causes of an unsatisfactory IAC.

- Test results within the tolerance
- Proper equipment to conduct sampling and testing
- Equipment properly calibrated and in good working order
- Sampling and testing conducted according to prescribed MT methods
- Willingness to participate in an IAC (Indicate refusal in remarks section of the IAC report)

Every effort should be made to correct equipment or procedural problems immediately. A follow-up IAC investigation must be initiated within five working days to ensure that equipment and procedures are satisfactory. The IAC must be repeated until the problem is corrected and a satisfactory IAC is completed.

Reporting – Results of IAC's including corrective action is recorded in SiteManager.

4.2 Independent Assurance Procedural (IAP)

Description – IAP checks are performed to verify conformance with contract standards and testing criteria through review of test procedures. The IAP will be conducted on the jobsite while the tester is in the process of running normal acceptance testing for job control.

Purpose – A key part of the IAP is witnessing the sampling and testing to verify that proper procedures are being followed. The calibration and condition of sampling and testing equipment used should be carefully checked.

Frequency – The frequencies at which IAP checks are performed should conform in general to MT 601. These frequencies have been reviewed and approved by the FHWA. Rigid conformity with a frequency pattern established as a guide for general application is not expected. In general, the given frequencies are set at a minimum. Each IAP assessment performed on a project may fulfill the same IAP requirement for other projects when performed by the same technician within 30 days.

Responsibility – IAP's are a joint effort between the District/Area Materials Lab Supervisors, Area Lab Coordinators, District and Area Lab Technicians and MDT Materials Headquarter personnel. IAP requirements apply to all persons conducting acceptance sampling and testing on behalf of MDT. IAP's must be performed by personnel not normally involved in the acceptance testing for the project.

Acceptability – IAP results that are considered unsatisfactory must be investigated by the appropriate District Materials Supervisor or MDT Materials Headquarter personnel to identify the cause and corrective action needed. Document any corrective action for the project file with copies sent to the Inspection Operations Supervisor. Unsatisfactory IAP's should be brought to the attention of the corresponding Project Manager. Failure to demonstrate the following are typical causes of an unsatisfactory IAP.

- Proper equipment to conduct sampling and testing
- Equipment properly calibrated and in good working order
- Sampling and testing conducted according to prescribed MT methods
- Willingness to participate in an IAC (Indicate refusal in the remarks section of the IAP report)

The personnel proctoring the IAP will explain to the tester why the test was unsatisfactory and how it needs to be corrected. Every effort should be made to correct equipment or procedural problems at this time. The IAP should then be repeated until the problem is corrected and a satisfactory IAP is completed. If a satisfactory IAP cannot be achieved due to tester deficiencies, notification and documentation will be provided to the WAQTC coordinator and additional training or revocation of certification may be required.

Reporting – Results of IAC's, including corrective action, is recorded in SiteManager.

4.3 Proficiency Samples

Description – Proficiency testing is an outline designed to test accuracy of District/Area Laboratories and MDT Materials Headquarter Laboratories.

Purpose – Laboratories can judge their testing results by comparing them to a large body of results performed on the same material. The quality of test results can be demonstrated, thereby reducing the risk of disputes due to testing errors. The program also provides laboratories with the means to check both the testing apparatus and the operator under actual testing conditions.

Processing Material and Sample Distribution – Homogeneity of samples is controlled during the production process. Materials are selected from known sources and are inspected when received. The materials are thoroughly blended in accordance with established schemes. The sample is then reduced for the multiple-testing process.

Frequency – Proficiency samples are distributed to participants once per year, with a pair of unique samples provided each time. When testing is complete, laboratories submit their testing results for analysis.

Tests – Proficiency tests are performed on the following procedures:

- AASHTO T 85 Specific Gravity and Absorption of Coarse Aggregate
- AASHTO T 89 Determining the Liquid Limit of Soils
- AASHTO T 90 Determining the Plastic Limit & Plasticity Index of Soils
- AASHTO T 166 Bulk Specific Gravity (Gmb) of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface-Dry Specimens
- AASHTO T 335 Determining the Percentage of Fracture in Coarse Aggregate
- MT 202 Sieve Analysis of Fine and Coarse Aggregate
- MT 210 Proctor (5.5 LB)
- MT 230 Proctor (10 LB)
- MT 305 Volume Swell of Bituminous Mixtures – Caliper Method
- MT 319 Asphalt Binder Content of Hot Mix Asphalt (HMA) by Ignition Method
- MT 320 Mechanical Analysis of Aggregate Recovered from Ignition Oven Burn
- MT 321 Determining Maximum Specific Gravity of Bituminous Paving Mixtures – "Rice Method"
- MT 332 Gyratory Compaction of Bituminous Mixtures

Responsibility – The Inspection Operations Unit of the Physical Testing Section is responsible for composition, distribution, analysis and reporting of proficiency samples.

Reporting – When an individual laboratory completes the proficiency sample testing, the technician reports results to the Inspection Operations Unit. Results from all laboratories are then compiled and reports are distributed to each individual laboratory. If corrective actions are required, a notification will be sent out by the Inspection Operations Unit to laboratories with deficient results. The District Material Laboratory Supervisor is responsible for responding to the deficiency.

4.4 Lab and Equipment Inspections

Description – The Physical Testing Section conducts annual inspections on District, Area, and MDT Materials Headquarters Laboratories and equipment used for acceptance testing.

Purpose – Laboratory and equipment inspections are performed to demonstrate competency in the performance of specific test procedures and that testing equipment is within procedural requirements.

Frequency – Equipment and procedural inspections are performed annually.

Responsibility – The Inspection Operations Unit conducts and reports procedural inspections performed in District and Area Laboratories. MDT Materials Headquarters Laboratory Supervisors conduct procedural inspections on technicians performing testing under their supervision. Equipment calibrations and verifications are a joint effort between the Inspection Operations Unit and MDT Materials Laboratory Supervisors.

Reporting – Procedures observed by the Inspection Operations personnel are entered into SiteManager and summarized in a hard copy report that is sent to the District Administrator and Materials Bureau Engineer. Equipment calibrations and verifications are entered into SiteManager by the applicable Materials Laboratory Supervisor or a designated representative. Each laboratory is responsible for sustaining up to date calibration/verification of testing equipment. An equipment status report may be generated by Oracle.

5 FINAL RECORD (FR)

Description – FR samples are physical comparisons between design plan dimensions and those actually achieved during construction.

Purpose – FR core samples are taken and analyzed for the following purposes:

- To determine adequacy of pavement thickness and other construction requirements but not for the purpose of checking compliance with specification requirements. These samples are taken to verify conformity with plans and specification requirements applicable to the completed construction.
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- To furnish information relative to the amounts of change in properties of the material used in the work. FR samples and tests are for physical research purposes to ascertain the need and basis for possible improvements in future designs and specifications.
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- To determine if corrective measures may be necessary. FR samples and tests serve to indicate whether previously unknown or unsuspected conditions may exist on the project that may have a detrimental effect on the completed construction.

Frequency of Sampling – The frequency of FR samples is stated in MT 601.

Responsibility – Samples must be witnessed by or under the direct supervision of the District/Area Lab Supervisor or their designated representative and must not be scheduled on such an inflexible and regular routine that its frequency can be predicted. Sufficient samples must be submitted to satisfy the frequency intended.

Sampling and Testing – These samples are taken at random per MT 606 from completed construction work or completed portions thereof.

FR samples should be taken at each individual stage of the construction work as it is completed and before it is covered or disturbed by a subsequent construction stage. This minimizes damage to finished work and facilitates the satisfactory procurement of samples. FR core sample locations will be referenced to centerline.

Whenever test results indicate that significant changes have occurred (because of processing, contamination, or other reasons, after the materials were incorporated into the construction), these changes should be reported with an explanation.

Reporting – Results of FR samples including corrective action are recorded in SiteManager.