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## **FOREWORD**

Sampling and testing schedules prepared prior to job (project) construction are general guides for evaluating the quality of materials and workmanship incorporated in a highway or bridge. Accordingly, this manual contains a general frequency schedule for acceptance sampling and testing. Select lots or sites for sampling/testing under these frequencies per the random number procedure (ALDOT-210) in this manual. If test results vary significantly and/or marginal quality of materials or workmanship are noted-develop more frequent schedules of sampling and testing. Our objective is to ensure acceptance eligibility of any given lot of materials or workmanship. Materials from sources consistently producing acceptable material may require less frequent testing.

## SECTION I

### GENERAL INFORMATION

The Bureau of Materials and Tests of the Alabama Department of Transportation is directed by the Materials and Tests Engineer. He is responsible for evaluation of all materials functions within the Department. The Bureau is composed of the following sections: Materials, Central Testing Laboratory, and Geotechnical. Responsibilities of the Materials and Tests Engineer are further executed through Area Materials Engineers.

Area and Project Laboratories are under the general supervision of the Area Materials Engineer. Responsibilities include the quality of all acceptance sampling and testing of materials fabricated at or near the project site, i.e., soils and/or aggregate bases, Portland cement concrete, bituminous concrete mixes, etc. Duties include the review of the capabilities of all testing personnel, and their proficiency in and knowledge of the sampling and testing frequencies/procedures. He is also responsible for frequent condition checks of testing equipment used in laboratories under his supervision. When consistent failures of acceptance samples or tests occur, the Area Materials Engineer initiates an investigation. He reports his findings and actions taken or recommendations to alleviate further occurrence to the Materials and Tests Engineer. Additionally, the Area Materials Engineer directs periodic reviews of all Testing Manuals in his area for current additions or deletions.

The Central Testing Laboratory in Montgomery is directed by the Testing Engineer. Responsibilities include all chemical tests, specialty tests, standardization and uniformity of tests, and quality tests that Area or Project Laboratories are not equipped to perform. Tests are performed in accordance with Standard or Interim Standard ASTM, AASHTO, Federal Standard Specification Procedures or Alabama Department of Transportation Test Procedures.

The Materials and Tests Engineer establishes test frequencies and procedures for new products or procedures incorporated in contracts. This is accomplished for required test methods and frequencies not included in this manual.

### **TYPES OF SAMPLES AND TESTS**

- A. Quality or Informational Samples and Tests are, in general, performed on a pre-contract basis in order to determine the eligibility of a source to furnish materials or products that will consistently meet acceptance test requirements.
- B. Acceptance Samples and Tests are those performed during construction for determining if contract requirements are being fulfilled.
- C. Certified Acceptance Samples and Tests are performed by authorized producers shown in the Manual of Materials, Sources and Devices with Special Acceptance Requirements which contains a current list of pre-qualified producers and products.
- D. Comparison and Correlation Samples and Tests are used to determine if any significant variation in results is occurring between laboratories or operators performing test(s) on a given lot or standardized sample of material.
- E. Independent Assurance Samples and Tests are similar to comparison samples but may represent different lots of material than used for acceptance sampling and tests.

## SECTION II

### 1. Acceptance and Independent Assurance Samples and Tests

- a. Acceptance Samples and Tests are those samples taken and tested for determining the quality and acceptability of the materials and workmanship which have been or are being incorporated in the project. The collection of samples and proper tests (materials fabricated or produced at points away from the job site excepted) along with test reports are the responsibility of the Project Engineer (State, Municipal, County). The Project Engineer or his representative should review all test reports for accuracy and completeness regardless of whether the test was performed on the project, in the Area Laboratory, the Central Testing Laboratory, by a Certified Producer Laboratory or any other approved inspection agency. Acceptance samples and tests will be taken and performed at the proper point or stage of construction and in accordance with the scheduled frequency contained in the current Testing Manual or subsequently adopted plan for a specific project.

Acceptance samples and tests of materials manufactured and/or fabricated away from the project site may be pre-sampled and tested before delivery to the project by Area or Central Office Materials and Tests personnel or by manufacturer's personnel when the material is from an approved source of producer certified materials. All pre-inspected materials will be marked in accordance with the required markings contained in the Testing Manual and test reports forwarded to the Project Engineer. The Project Engineer will determine the final acceptability of pre-inspected and tested materials at the time they are incorporated in the work.

- b. All pre-inspected and tested materials, whether by Department or other authorized personnel, are subject to further verification or comparison tests obtained under the Independent Assurance Sampling and Testing Program.
- c. Independent Assurance Samples and Tests are those samples and tests performed or observed by Department personnel who do not normally have direct responsibility for acceptance sampling and testing at the project level. These teams operate under the direct supervision of the Area Materials Engineer or Central Office Materials and Tests Certification Engineer using equipment other than that assigned to the project for acceptance sampling and testing. These tests are used for the purpose of making independent checks on reliability of the results obtained in acceptance sampling and testing. Independent Assurance samples may also be taken or observed by members of the Area or Central Office Construction Engineer's staff as well as construction engineering representatives of the Federal Highway Administration.

Independent Assurance samples and tests will be taken or observed in accordance with the current schedule.

### 2. Comparative Testing by the Department

- a. Verification of acceptance samples and tests on materials conducted by project using field laboratories and equipment will be done under a program of comparative testing of companion samples. Samples and tests taken under the Independent Assurance Sampling and Testing Program may be used for this purpose and should be companion samples or tests. Comparison of field and Central Laboratory test results will assure that the test equipment in use is in good condition and accurate, and that the test procedures are being followed correctly. This comparison is the direct responsibility of the Area Materials Engineer and will be made promptly to assure that materials and workmanship being

incorporated in the project are of acceptable quality. Any substantial variations of tests results will be investigated promptly by the Area Materials and Construction Engineers or their representatives and reported. The report will be furnished to the Central Office Materials and Tests Certification Engineer and will state whether variations were caused by testing equipment, procedures used in acceptance sampling and testing, or contractor mishandling of the material, and steps taken to correct or resolve the unacceptable variation in test results.

- b. When acceptance sample tests are performed in an Area Laboratory, verification and reports of comparison checks on companion or independent assurance sample test results performed by the Central Laboratory are the direct responsibility of the Area Materials Engineer and any significant variation(s) reported will be handled the same as in the preceding article.
- c. When acceptance sample tests are performed by the Central Testing Laboratory or by a producer's laboratory, verification of comparison checks on companion or independent assurance sample test results will be the direct responsibility of the Materials and Tests Certification Engineer. When substantial variations of test results occur, he will initiate a prompt investigation through the responsible division head of the Central Laboratory, and include the findings and resolution of such problems in the Independent Assurance Samples and Tests report.
- d. Definition of significant or substantial variation in comparison or correlation test results is as follows:
  - i) If the required test procedure, i.e. AASHTO, ASTM or ALDOT, has a precision statement, multi-laboratory precision requirements may be allowed; or,
  - ii) In the absence of such precision statement in the test procedure, results, obviously in error, or in general when differing by more than twenty-five percentage points from the mean of the test results, shall be considered a significant variation.

## SECTION III

### 1. Materials Certification

- a. All materials incorporated into the construction of a highway or bridge project with Federal Aid participation will be certified. The certificate attests that all materials used were in substantial compliance with the pertinent specification requirements of the contract except as noted on the certificate. Items that were accepted with less than normal or no test results will be listed on forms BMT-16 (Exhibit C) or BMT-38 (Exhibit B) at the end of the project showing date, material, manufacturer, quantities accepted, and any comments applicable such as dimension checks (if applicable), workmanship, and general appearance, etc. The forms should be signed by the project engineer and forwarded to the Area Materials Engineer for acceptance prior to being incorporated into the final certification report BMT-38.
- b. The Materials Certificate (Exhibit A) is initiated by the Project Engineer preparing a list of quantities and the corresponding laboratory test number for such quantities of all materials incorporated in the construction of the project. This report is prepared on standard form BMT-38 (Exhibit B) and upon completion of all work is forwarded to the Central Office Materials and Tests Engineer for final preparation of the Materials Certificate which is submitted to the FHWA Division Administrator.

### 2. Acceptance of Small Quantities of Miscellaneous Materials on the Basis of Visual Inspection or Manufacturer Certification

The Testing Manual general instructions have provisions for acceptance of miscellaneous material items when quantities received are in lots substantially less than those used for minimum sampling and testing. When authorized by the Area Materials Engineer, the Project Engineer may accept such materials by manufacturer's certified test report, or by visual inspection if the material is from a reputable manufacturer. When accepted on a visual basis, the Project Engineer will prepare a standard miscellaneous materials test report form BMT-16 (Exhibit C) at the time the material is incorporated into the project. Form BMT-16 will list the date, material, manufacturer, quantities accepted, and any comments applicable such as dimension checks, workmanship, general appearance, etc. The test report will be included in the final materials certificate preparation report (BMT-38).

## SECTION IV

### 1. National Reference Laboratory Inspections

- a. The Alabama Department of Transportation Central Laboratory regularly participates in laboratory inspections and testing of comparative samples conducted by AMRL and CCRL. These reference laboratories have been authorized to furnish copies of their inspection and comparative test results to both FHWA Division and Regional Administrators. Laboratory test equipment and standard test procedures are reviewed for tests on soil, aggregate, liquid bituminous materials and bituminous mixtures by AMRL, and by CCRL for cement, concrete and reinforcing steel standard tests. Any discrepancies noted in such reports are resolved by equipment replacement or thorough study of test procedures. Also, the Central Laboratory is accredited by AASHTO in many areas under AASHTO R 18, Establishing and Implementing a Quality System for Construction Materials Testing Laboratories.
- b. Due to the expense involved, the Department does not provide for AMRL or CCRL inspection tours and comparative tests for its Area Laboratories. The Department's Central Laboratory has conducted a comparative testing program for soils and bituminous mixtures with the Area Laboratories for several years. An annual inspection tour by Central Laboratory teams of Area and producer laboratory equipment and procedures similar to AMRL and CCRL inspections has been adopted by the Department. A check list type of report showing discrepancies in equipment and procedures is forwarded to the Materials and Tests Engineer, Testing Engineer, Area Operations Engineer, and Area Materials Engineer. A copy of this report will be forwarded to the FHWA Division Administrator on a regular basis if requested. After action has been taken to correct all discrepancies shown on the check list, the Area Materials Engineer will be responsible for writing a letter to the Materials and Tests Engineer explaining this corrective action. The distribution of this letter will be the same as the check list. All equipment found in substantial compliance will be tagged and the tag number recorded on the inspection report.
- c. Regular inspections of Area and project laboratory equipment and test procedures are the responsibility of the Area Materials Engineer. A written report of any discrepancies noted and actions taken are to be forwarded to the Central Office Materials and Tests Engineer.



SECTION V

**Certification of Materials and Tests**

Division Administrator  
Federal Highway Administration  
500 Eastern Blvd., Suite 200  
Montgomery, Alabama 36117-2018

or

Office Engineer  
Alabama Department of Transportation  
1409 Coliseum Boulevard  
Montgomery, Alabama 36110

Re:

Dear Sir:

This is to certify that the results of the tests used in the acceptance program indicate that the material incorporated in the construction work, and the construction operations controlled by sampling and testing, were in conformity with the approved plans and specifications. All independent assurance samples and tests are within the tolerance limits of the samples and tests that are used in the acceptance program. Both the IAS&T **Record Check** (Accepted 00/00/00) and the BMT-38 Materials Certification are now complete.

Yours very truly,

Materials & Tests Engineer

cc: Office Engineer (if addressed to FHWA)  
Construction Engineer  
County Transportation Engineer (if applicable)  
**Region** Engineer  
File (2)

**BMT-38**

See BMT-38

**BMT-16**

See BMT-16