

## **Required Samples, Tests, and Certificates (RSTC)**

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### **1. Introduction:**

Each certificate received, sample taken, or test made shall be recorded, managed, and used as described. Sampling and testing shall be in accordance with the South Dakota Materials Manual, the South Dakota Materials Testing & Inspection Certification Program Manual, AASHTO, ASTM, or as directed by the Chief Materials and Surfacing Engineer.

Only new or clean containers (Bags, bottles, cans, etc.) shall be used for obtaining and transporting sample specimens. Each container shall be examined, to determine that it is clean and free from contamination. Sample containers are available through the Region Materials Office.

### **2. Location and Frequency:**

The location and frequency at which samples are taken and tests made shall be in accordance with MSTR.

Contracts that include more than one project shall be considered one project for calculating the minimum number of samples and tests required.

### **3. Sample Size:**

Each sample shall be large enough to provide a minimum of two specimens for testing, or as directed by the applicable testing procedure. Standby specimens are to be tested immediately, in event of accidental loss, or known or suspected error in the first analysis. All tests must be reported, with explanations, when standby specimens are tested. Standby specimens will not be tested solely to confirm results of tests.

### **4. Identification:**

Every sample or test for each kind of material or construction shall be numbered consecutively, starting with the number one, for each project. Contracts, which include more than one project, shall be considered one project for the purposes of numbering the samples and tests.

Results of tests on samples, representing material used on two or more contracts, shall be reported for each contract to ensure the maintenance of proper individual project files.

Preparation of sample data information – The Sample Data Sheet (DOT-1) shall be complete and accompany each sample submitted to a laboratory not located on the project. When a sample is tested in the laboratory located on the project, the sample information may be recorded on the test worksheet or report.

Data required on a Sample Data Sheet (DOT-1):

Submitted by: The name, title, and office of the individual submitting the sample.

Send results to: The name, title, and office to whom the results should be sent.

Contractor and subcontractor: Show the prime Contractor (And subcontractor when it applies to a subcontractor).

Project: Show the project number as it appears on the plans or proposal.

PCN: Show the PCN number as it appears on the plans or proposal.

County: Show all counties that the project is in, as shown on the plans or proposal.

Charge To: Self-explanatory.

This is a \_\_\_\_\_ sample: Identify the type of sample e.g., acceptance, IA, quality, mix design, information, etc.

Field number: Show the sample number as in Section 4.

Date sampled: The date the sample was taken.

This sample represents: Quantity represented in feet, cubic yards, gallons, tons, cars, sacks, cwt., miles, Sta. \_\_\_\_\_ to Sta. \_\_\_\_\_, lift, ticket number, and sufficient other information to describe the exact unit and location of material represented by the sample.

For material placed, identify the lift, its thickness, and the total thickness. Identify the last (top) lift as "final lift". For example, if total thickness is 12 in. placed in 3 in. lifts, indicate them as 1st: 3/12; 2nd: 6/12; 3rd: 9/12; and "final lift": 12/12.

Type of material: Kind of material and intended use.

For material shipped in: Self-explanatory.

For local material: Self-explanatory.

Shipping ticket #: Self-explanatory.

Truck or car #: Self-explanatory.

Unloaded at: Self-explanatory.

Use the space at the bottom and the back of the form for additional data, instructions, or remarks.

List special tests required.

Request the return for project use of items or materials (Hardware, cast iron or steel, paint submitted in large containers, posts, etc.) submitted to laboratories for sampling or non-destructive tests.

Record the percentages of each component when samples of blended materials are submitted.

Sample Data Envelope (DOT-2) – The data envelope shall be completed in the same manner as the DOT-1, by the individual sampling or submitting the material for test.

Miscellaneous – When practical, an identification card, note, or slip should be placed inside the sample bag or container. This eliminates the possibility of voiding the test due to conflicting or lost data sheets or envelopes.

#### 4.1 Acceptance Samples and Tests.

- A. Use numbers only, e.g., 01, 02, 03, etc. as opposed to letters of the alphabet as sample or test identification numbers. The numbers 1 thru 9 will be 01, 02, 03, etc. Sample numbers 10 thru 99 will not be preceded by a "0". This scenario will always be true for all materials or test types unless it is anticipated before a project begins that there will be more than 100 certificates, samples or tests for a particular material. If that is the case, test numbers 1 thru 9 will be preceded by two 00's e.g.; 001, 002, 003, etc. Test numbers 10 thru 99 will be preceded by one 0 e.g.; 010, 011, 012, etc. samples and tests from 100 to 999 will not be preceded by a 0.

The prefix "E", "P", "PP", "B", "U", "BEE" or "EM" should be used to distinguish between embankment, pipe, pre-installation pipe, berm, undercut densities, bridge end embankment and embankment moisture.

- B. A set of 4 concrete cylinders are required as per the minimum requirements for concrete. The cylinders shall be numbered 05, 05A, 05B and 05C. Cylinder 05 shall always be used for the 28 day break, 05A as the 28 day break (Back-up), 05B and 05C shall be used for early breaks. It is recommended that the early breaks be tested at 7 and 14 days respectively. These numbers shall be provided on one end of the cylinder in accordance with the example provided in SD 405.

The data provided on the DOT-23 for cylinder sets for concrete shall provide all data necessary to make proper identification of the section represented. In addition to the routine information (Test #., station, date made, etc.), the data must also include detailed information for the structure such as the section of the box culvert which are numbered 1, 2, 3, 4, 5, etc. from left to right on the box when viewing the structure in the direction of ascending project stationing or one of the bridge components as provided below:

##### Box Culverts

B.S. = Bottom slab  
BBL. = Side walls and top slab  
W.W. = Wing wall  
Apron = Apron  
C/W = Cut off wall  
T.S. = Top slab, if poured separate from the sides.  
S.W. = Side walls, if poured separate from the top slab.

##### Bridges

Bent #3 Ftg.  
Bent #8 Cap.  
Abutment #1  
Bridge deck  
Barrier curb (Lt., Rt.)

- C. Concrete test cylinders shall be numbered consecutively for each class of concrete. Class A45 paving shall be numbered separately from other Class A45 concrete.

D. The quantity represented shall be determined and noted on the test report.

#### 4.2 Quality Control and Quality Assurance.

For quality control, use the prefix "QC", e.g., QC01, QC02, QC03, etc.

For quality assurance use the prefix "QA" and the related QC test, e.g. QA01/QC01, QA02/QC06, QA03/QC14, etc.

For independent assurance, use the prefix "IA" and the related QA and QC test numbers, e.g. IA01/QA01/QC01, IA02/QA03/QC14, etc.

For non-pay factor material, use the prefix "N", e.g. NQC01, NQC02, etc. or NQA01/ NQC01, NQA02/ NQC06, etc.

For test strip the prefix "TS", e.g. TS01, TS02, TS03, etc.

For correlation of the plant, use prefix "COR", e.g., COR01, COR02, etc. These are informational tests for correlation of the plant.

#### 4.3 Corrective Action Samples and Tests.

Corrective action samples and tests shall carry the same number as the failing test with the suffix "X". For example, embankment E03 fails, the Contractor is immediately notified, and the corrective action completed.

The test of the corrected material or construction would be identified as E03X. If the corrective action had not produced specification compliance, e.g., E03X failed, the sample or test taken to confirm the effectiveness of the additional or new corrective effort would be identified E03XX, etc. Satisfactory results obtained on an "X" sample or test indicates that the corrective action has been successful, the material or construction has been brought into compliance, and sampling and testing can continue, using the next consecutively numbered samples, e.g., E04, E05, etc.

#### 4.4 Process Correction Samples and Tests.

Process correction samples and tests shall carry the same number as the failing test with the suffix "PC". For example, Class S Asphalt Concrete Aggregate Composite test 05 fails, the Contractor is immediately notified, and the plant is shut down.

The test of the corrected material would be identified as 05PC. If the process adjustment does not produce specification compliance, e.g., 05PC fails, the sample or test taken to confirm the effectiveness of the additional adjustment to the process would be identified as 05PCC, etc. After satisfactory test results are obtained, the plant shall restart, and sampling and testing would continue, using the next consecutively numbered samples, e.g., 06, 07, etc.

#### 4.5 Failing Acceptance Samples and Tests.

Use the number as identified by the acceptance sample.

**4.6 Independent Assurance Sample and Tests.**

Use prefix "IA" and related test number and the related acceptance test number, e.g., IA01/01, IA02/05, IA03/10, etc.

**4.7 Remedial Action Samples and Tests.**

Use the suffix "R" and related test number of sample. For example, IA test number IA04/22 is outside the tolerances outlined in Section 5, remedial action test IA04R/22R is made to confirm remedial action to be successful. If remedial action is unsuccessful additional remedial action tests IA04RR/22RR, etc. will be made.

**4.8 Quality Sample and Tests.**

Use prefix "Q", e.g., Q01, Q02, Q03, etc.

**4.9 Information Samples and Tests.**

Use prefix "Info", e.g., Info 01, Info 02, Info 03, etc. unless otherwise noted.

**4.10 Mix Design Samples and Tests.**

Use prefix "MD", e.g., MD 01, MD 02, MD 03, etc.

**4.11 Certificates.**

Use numerical sequence for each type of material certified, e.g., 01, 02, 03, etc.

**4.12 Certified Suppliers.**

Any method approved by the Certification Office that will ensure identification.

**4.13 Approved Products List.**

Any method approved by the Certification Office that will ensure identification.  
The Approved Products List can be found at the SDDOT website.

**4.14 Umbrella Certificates.**

The "Certificate Group ID" number generated by the Materials Sampling and Testing (MS&T) system, or any method that will ensure identification.

**4.15 Sample and Tests for other Agencies (Outside Testing).**

Any method that will ensure identification.

**4.16 Standby Samples.**

Standby samples shall carry the number of the sample followed by an "A" or "B". When it is necessary to test a standby specimen, the test will carry the same number followed by an "A" or "B".

Where the Certificate of Compliance bears the number, the samples taken shall be numbered A and B. Example: Asphalt cement, the certificate is considered to be 1, the samples taken will be 01A and 01B.

## **5. Operational Procedures:**

### **5.1 Acceptance Samples and Tests.**

#### Scope.

This procedure outlines the requirements for acceptance sampling and testing by personnel under supervision of the Area Engineer to align such control to comply with FHWA requirements.

#### Definition.

Acceptance samples and tests include the samples and tests used for determining the acceptability of the materials and workmanship which have been or are being incorporated in the project. They are the principal basis for determining the acceptability of the projects' materials and construction.

#### Operational Procedure.

Acceptance sampling and testing at the construction site will normally be performed by qualified technicians from the Area Engineer's crew and under his direction in laboratory facilities provided for that purpose. Special tests required for acceptance or samples requiring special equipment not available on the project shall be submitted to the Region or Central Testing Laboratories.

When deemed necessary by the Region Engineer to expedite the testing program or assure dependable acceptance test results, he will direct the Region Materials Engineer to assign qualified technicians to the Area Engineer to make such tests. The Area Engineer will direct the activities of the assigned personnel. They will not be allowed to take IA samples or tests on that project material. Upon request by the Area Engineer, the Central Testing Laboratory will make tests on acceptance samples.

Sampling and testing should be supplemented by sufficient visual inspection of the materials as a whole, to ascertain whether the samples and tests are reasonably representative of the entire mass. In addition, there should be sufficient observation of the construction operations and processes to determine whether they can be expected to consistently produce uniform, satisfactory results.

The number of acceptance samples and the distribution of the locations from which they are to be taken are intended to be such as to adequately assure or verify that the materials incorporated and the construction produced are acceptable in accordance with the plans and specifications including approved changes.

The sampling and testing must be such that a decision regarding acceptance of materials and workmanship can generally be made as construction progresses.

Acceptance samples shall be:

- A. Taken and tested at the construction site by project, Region, or Central Testing Laboratory personnel who are not associated with the taking of IA samples for that material and project.
- B. Obtained at a production or processing plant, or other source away from the project and tested in the Region or Central Testing Laboratory. Even though previously sampled at some other point by project personnel, a reasonable number of acceptance samples for aggregates are to be taken at either:
  - (1) The point they are to be incorporated in the work.
  - (2) The point they are to be mixed with other materials.
- C. Samples of manufactured products that are not easily contaminated or otherwise not normally susceptible to changes in characteristics that are tested by the manufacturer.

For these products:

- (1) Numerical test results or certificates as to conformity with specification requirements are to be sent to the Area Engineer's Office when shipment is made.

This consideration shall be immediately revoked if such certification is found to be unreliable.

- (2) Occasional sampling and testing shall be done by representatives of the State to provide assurance of the reliability of the results obtained by the manufacturer or supplier.
- D. Previously accepted materials transferred from another project, when accompanied with a Letter of Transfer (DOT-70), may be accepted on the previous basis for acceptance.
- E. When an acceptance test fails, and the process continues without shutting down (e.g., slump, entrained air tests) an acceptance test shall be performed immediately after the contractor has had the opportunity to correct the subsequent material.

Samples taken and tested to confirm specification compliance of materials tested after a failing test while production continues are acceptance samples as they represent material produced and placed on the project; therefore, they shall be numbered as the next consecutive acceptance sample.

5.2 Quality Control and Quality Assurance.

Definition.

Quality Control and Quality Assurance samples and tests are used in association with Asphalt Concrete – Class Q.

Operational Procedure.

The contractor or his representative shall perform all quality control “QC” tests. A representative of the Area Office shall perform the quality assurance “QA” tests. Prior to production the QC and the QA testers shall perform, correlation tests as a method of assuring equipment and personnel are performing tests in accordance with the Materials Manual.

Production testing procedures shall be as specified in Section 322 of the Standard Specifications.

5.3 Corrective Action Samples and Tests.

Definition.

Corrective action samples and tests are used to determine the effectiveness of any action implemented to remedy a specification deficiency detected or confirmed by a failing acceptance test.

The corrective action test represents the same lot of material or unit of work as the failing acceptance test. The corrective action test becomes the acceptance test after the entire lot or unit has been satisfactorily corrected.

Operational Procedure.

When an acceptance test fails and appropriate action is taken to correct the entire lot represented by the test, a corrective action test shall be performed to check the validity of the corrective action taken. This test shall be taken from the same location or in such a manner that it represents the same lot as the acceptance test. If the corrective action test confirms the non-specification condition has been corrected, this test becomes the basis of acceptance for the material or construction involved.

If the corrective action test determines the non-specification condition still exists, further corrective action and tests will be required until the condition has been satisfactorily corrected. Details of each corrective action shall be noted on the worksheet or report for the appropriate corrective action test.

5.4 Process Correction Samples and Tests.

Definition.

Process Correction Samples and Tests represent the effectiveness of action taken to correct a process. The material represented by the failing acceptance test has generally been mixed with other materials such as lime, asphalt, or Portland



cement and placed on the project; therefore, it is impossible to correct the in-place material.

Operational Procedure.

When an acceptance test fails, and the process is shut down, the contractor shall perform a correction to the process. A process correction test shall be performed to determine effectiveness of the action taken. Before the process is allowed to continue, a passing process correction test must be performed. This process correction test does not represent any material and shall be recorded as a process correction test.

An acceptance test shall be taken shortly after the process resumes.

5.5 Failing Acceptance Samples and Tests.

Definition.

A failing acceptance sample or test is a test that is outside specifications.

Operational Procedure.

The following procedure is to be used when the work or material incorporated into the project does not meet specifications, corrective action is not feasible and the Area Engineer has determined that the work or material can remain in place.

- A. The Area Engineer will prepare a DOT-18 form setting forth the details of the non-specification work or materials including quantity, location, and an explanation of action taken as a result of the specification deviation. The Area Engineer will submit the DOT-18 form to the Region Engineer. Copies of test results or test numbers and a full explanation of the situation will accompany the DOT-18.

Samples for acceptance tests will represent a quantity of material determined as follows: One-half of material produced from the time the previous sample was taken until the current sample is obtained plus one-half of the material produced between the time of sampling the current sample and the time the next sample is taken, except as noted below.

- (1) The first sample will represent material produced from the start of production, ahead to midpoint of when the next sample is taken.
- (2) The final sample will represent material produced back to midpoint with the previous sample and ahead to the end of production.
- (3) A failing sample will represent material produced back to the midpoint with the previous sample and ahead to when production is stopped and process correction measure taken; or production continues and corrective measure is taken.
- (4) The second and subsequent, consecutive, failing tests represent all material produced from the previous process correction or corrective

measure ahead to when production is again stopped and/or corrective measure is taken.

- (5) The next passing sample after a failure will represent material produced after production stopped and process correction measure taken; or production continues and corrective measure is taken ahead to midpoint of when the next sample is taken.

The testing frequency is irrespective of the quantity represented. A failing sample may represent more material than testing frequency.

There are exceptions to this guidance. If a test is missed, the test results from a test adjacent to a missed test cannot represent more than the minimum testing frequency. Manufactured materials represented by batch, lot, etc., will represent the entire batch, lot, etc.

- B. The Region Office will determine the price adjustment for the non-specification material that has been allowed to remain in place and attach the letter to the DOT-18. The price adjustment letter will be submitted to the Contractor by the Region Office. Price adjustment will be administered according to the "Price Adjustment Guidelines" and/or other relative information and/or personal contacts with individuals who are resource experts.

#### Asphalt Test Reproducibility Tolerances

Test results which fall outside the specification limits for a particular test, but within the test reproducibility tolerance as set forth below, will be acceptable.

Cut-Back Asphalt	
Test	Tolerance*
Flash Point	
Tag Open Cup (Ave. of three test).....	4°F
Cleveland Open Cup .....	15°
Viscosity	
Kinematic, 140°F (To 3000 CS).....	1.5%
Kinematic, 140°F (Above 3000 CS).....	4.5%
Saybolt-Furol .....	4.55
Distillation	
Distillate % by vol. (Up to 347°) .....	1.8% pts.
Distillate % by vol. (Above 347°).....	1.0% pt.
Residue % by vol.....	1.0% pt.
Test on Residue	
Penetration .....	8.0%
Solubility in CH <sub>3</sub> CCl <sub>3</sub> .....	0.13% pt.
Emulsified Asphalt	
Test	Tolerance*
Distillation	
Residue % by vol.....	1.0% pt.

Test on Residue

Penetration (100 or more).....	15 pen. pts.
Penetration (Less than 100) .....	8 pen. pts.

Asphalt Cement

Test	Tolerance*
Penetration	
Penetration, 77°F (Less than 50) .....	2 pen. pts.
Penetration, 77°F (50 or above).....	4%
Flash Point	
Cleveland Open Cup .....	15°F
Pensky-Marten's Closed Cup (Below 220°F) .....	3°F
Pensky-Marten's Closed Cup (Above 220°F).....	13°F
Viscosity	
Kinematic, 275°F .....	4.4%
Absolute, 140°F .....	5.0%
Solubility in CH <sub>3</sub> CCl <sub>3</sub> .....	0.13 pts.
Thin-film Test	
Loss on heating .....	20%
% of Original.....	4% pts.

\*When tolerances are expressed in terms of percent, the allowable deviation is calculated as the indicated percentage of the upper or lower specification limit, whichever is applicable.

## 5.6 Independent Assurance Sample and Tests.

### Definition.

IA samples and tests are the samples taken, tests made, and other procedures performed for the expressed purpose of making independent checks on the reliability of the results of acceptance sampling and testing. They do not provide test results for acceptance.

### Operational Procedure.

The taking of IA samples must be performed by personnel other than those doing the acceptance sampling of the same project material or construction. They must be:

- A. Region or Central Testing Laboratory personnel.
- B. Project personnel, at the location indicated by and under the observation of either Region or Central Testing Laboratory personnel, Supervisory Construction Engineers assigned to the State's Central or Region Offices, or an FHWA Engineer. The principle to be observed in taking IA samples is that they be selected by personnel other than those normally doing the acceptance sampling and testing.
- C. IA samples may be selected by Region or Central Testing Laboratory personnel, Supervisory Construction Engineers assigned to the State's Central or Region Offices, or an FHWA Engineer from samples taken for acceptance purposes; from samples of select or designated materials; or

samples prepared by the Region or Central Testing Laboratories for comparative analysis.

Such samples must be divided into two approximately equal test specimens. The splitting procedure shall be checked by a Region Materials representative. One test specimen is to be tested by project personnel and the other tested as an IA sample, in the Region or Central Testing Laboratory.

The testing of IA samples must be done with equipment other than that used for testing acceptance samples. Separate equipment will not be required when both acceptance and IA samples of the same material are tested in the Central Testing Laboratory.

Tests such as slump and air content of concrete and in-place density tests of construction must be performed in the field. IA testing in the field may be accomplished by observation of the acceptance testing, provided:

- (1) A reasonable number of tests are performed by Region or Central Testing Laboratory personnel.
- (2) The sampling and testing is closely observed and found to be in accordance with specified procedures.
- (3) The computations necessary to determine the test results are checked by the observer.
- (4) The observer is eligible to take or request the taking of IA samples and notes in the test report, or test worksheet, as having observed the testing.
- (5) Not more than 10% of all IA samples/tests, or portion thereof required on a project are accomplished by observation of acceptance testing.

It shall be the responsibility of the Region Materials Engineer to immediately make and document a comparison between the results of each IA test and the results of the same or similar materials or construction as tested for acceptance by project personnel using the following table:

Acceptable Tolerances for Comparison of IA Test Results (not including QC/QA Asphalt Concrete and IA).

Sieves	
80 to 100% passing .....	± 5
50 to 79% passing .....	± 4
30 to 49% passing .....	± 3
10 to 29% passing .....	± 2
0 to 9% passing .....	± 1
Liquid Limit and Plastic Index	
L.L. 30 or Over .....	± 3
L.L. 18 to 29 .....	± 2

L.L. below 18 .....	± 3
P.I. 11 to 20 .....	± 3
P.I. 5 to 10 .....	± 2
P.I. 0 to 4 .....	± 1

The tolerances shown above shall apply only when there is a specification on them.

Flakiness Index .....	± 5
Flat & elongated particles .....	± 2
Fine aggregate angularity .....	± 1.0
Light weight particles if spec max is ≤ 1.0 .....	± 0.5
Light weight particles if spec max is > 1.0 .....	± 1.0
Crushed particles.....	± 10
Air voids in asphalt concrete .....	± 1.2
Bulk specific gravity .....	± .020
Maximum specific gravity (Rice) .....	± .020
Unit weight of concrete .....	± 2.0 lbs./cu.ft.
Air content in fresh concrete .....	± 0.3
Temperature in fresh concrete.....	± 2°
In-place density, wet density.....	± 3.0 lbs.
Standard density, wet density .....	± 3.0 lbs.
In-place density, moisture content .....	± 2
1-Point Curve Plot .....	2 curves (Ohio) above or below

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When the results of 2 tests being compared fall into different tolerance groups, apply the group which permits the largest tolerance.

Example:

Acceptance test results: 47% Passing #4 Sieve  
(Acceptable tolerance: Plus or Minus 3 – 30 to 49% Passing)

IA test results: 51% Passing #4 Sieve  
(Acceptable tolerance: Plus or minus 4 – 50 to 79% Passing)

The tolerance to be applied shall be plus or minus 4.

Acceptable Tolerances for Comparison of Class Q Asphalt Concrete  
between QC, QA and IA

Sieve 3/8 inch and larger .....	± 5
Sieve #4 thru #50 .....	± 3
Sieve #100 thru #200 .....	± 1.5
Lightweight Particles.....	± 1.0
Sand Equivalent .....	± 7
Crushed Particles .....	± 10
Fine Aggregate Angularity .....	± 1.0
Air Voids .....	± 1.2
Bulk Specific Gravity of Asphalt Concrete (Gyratory) @ N <sub>design</sub> .....	± 0.020
Mixture Densification @ N <sub>design</sub> .....	± 1.2

Maximum Specific Gravity (Rice).....± 0.020  
Bulk Specific Gravity of In Place Density  
Cores.....± 0.020

The Region Materials Engineer shall:

- (1) When there are no, or only minor discrepancies, between the results of the two tests, note that fact on the report.
- (2) When the comparison indicates major or repeated differences, document on the report the type or the amount of each significant variation and the proposed remedial action.
- (3) Immediately following the remedial action, test to determine if the cause for variation found in the test results has been corrected. The remedial action IA ("R") test report shall contain a brief summary of the problem's detection and correction.

#### 5.7 Remedial Action Samples and Tests

##### Definition.

Remedial action is to determine the effectiveness of action employed to establish satisfactory alignment of the acceptance testing and IA testing. Remedial action may consist of, but is not limited to:

- A. Mechanical adjustment, calibration, repair, or replacement of equipment.
- B. Changes in, review, or revisions of sampling or testing procedures.

##### Operational Procedure.

The IA testing organization making the remedial action test shall document on the report (DOT-17):

- A. The problem requiring remedial action.
- B. Remedial action taken.

#### 5.8 Quality Samples and Tests.

##### Definition.

Quality tests are performed on aggregate samples and include L.A. abrasion, soundness, clay lumps, shrinkage, organic impurities, and color. Quality tests are generally performed on samples representing the material proposed for use, or samples from a material's production site prior to its use.

##### Operational Procedure.

It shall be the responsibility of the Area Engineer to ensure that the file for each project under his supervision contains the results of Quality tests required by the specifications. The record may consist of:

- A. The Central Testing Laboratory report of quality tests on mix design, acceptance, or IA samples.
- B. Copies of the results of quality tests performed on the material being used, that may be filed elsewhere, e.g., filed in the Region Materials or the Central Testing Laboratory.
- C. Copies of results of tests performed on the source of material being used, which has been sampled, tested, and reported for another project.
  - (1) When copies of test results are used, care shall be exercised to secure compliance with requirements of the specifications and this manual. Clearly state cross references so determination of the origin is absolute.
- D. The Region Materials Engineer shall:
  - (1) Provide the Area Engineer, upon request, copies of results of preliminary quality tests previously made on material to be used in construction. This information in the project file enables the Area Engineer to make an early appraisal of the degree of surveillance necessary for proper job control.
  - (2) Make a periodic routine inquiry or examination to determine the existence in the project file of current required quality test reports or copies of results.

#### 5.9 Information Samples and Tests.

##### Definition.

Information samples and tests are taken to evaluate, identify, investigate, and determine the acceptability of new products or material sources for potential future use. Information samples for a particular project may also be used to determine the results of a test segment or to determine additional data; e.g., only percentage passing a specific individual sieve or a particular characteristic, such as soundness, wear, etc., to provide data to establish a production or construction guide or find the percent air and slump of fresh concrete when a truck arrives. The MSTR does not apply and a DOT-18 will not be required.

##### Operational Procedure.

When an information sample or test is submitted to the Region Materials or Central Labs, the Sample Data Sheet (DOT-1) or new product evaluation request shall be completed for and submitted with each sample or test. When using the DOT-1 state the purpose of the sample or test clearly as remarks on the Sample Data Sheet; e.g., "Info #3, for P.I. only". Information test results for a particular project shall be reported and retained for additional project documentation.

#### 5.10 Mix Design Samples and Tests.

##### Definition.

Mix design samples and tests are made on material produced and intended for use in combinations that are established by the Central Testing Laboratory. Mix

production shall not be permitted until the design mix is obtained. Samples must be submitted to the Central Testing Laboratory in advance so tests and designs can be completed without delay to production or construction.

Operational Procedure.

To determine sampling and testing requirements for asphalt, lime, or Portland cement concrete materials for a mix design, consult the MSTR relating to the appropriate material or construction or contact the Region Materials Engineer.

The Sample Data Sheet and shipping envelope shall indicate what admixtures are to be used, if any, and material or project features that might be unusual.

**5.11 Samples and Tests for other Agencies (Outside Testing).**

The policy for performing sampling, testing, or related engineering work for outside agencies is as follows:

- A. The outside agency shall submit a written request explaining the nature, extent, and required completion dates of the work along with the address or addresses to which test results and billing of the work are to be sent.
- B. This written request shall be submitted to the Region Engineer when the requested work is to be performed by Region personnel. The Region Office shall forward the request to the Chief Materials and Surfacing Engineer along with a statement as to capability to do the work without interfering with the normal work schedule or Engineers in private practice, locally established, to do the type of work requested.
- C. The written request shall be submitted directly to the Chief Materials and Surfacing Engineer when the requested work is to be performed by Central Testing Laboratory personnel.
- D. The Chief Materials and Surfacing Engineer or the Region Engineer, upon receipt of the request, shall review the circumstances and advise the requesting agency in writing of the decision reached. Copies will be sent to the Region, Region Materials, and Area Engineers when they are involved in the requested work. Copies will be sent to the appropriate Central Office personnel when the requested work is to be performed by Central Testing Laboratory personnel.
- E. The written approval for the work, from the Chief Materials and Surfacing Engineer, shall include the accounts receivable number to which costs will be charged. A copy of the written approval shall be forwarded to Transportation Finance.

Requests may be made and approved by telephone provided written confirmation follows. Outside agencies will not be granted open authorization for a specific period of time but will be given approval on a job basis.



## 6. Certification Process:

### 6.1 Tier.

Certain materials used in highway construction present higher risks if failure occurs, depending on how they are made. The Department, therefore, has ranked the materials listed in the MSTR based on how they are used in the project. The resulting “Tiering” structure categorizes the materials from critical to non-critical. Definitions of the tiers are as follows:

**Tier 1:** A material that is critical to safety or costly to replace is considered extremely crucial to the overall success of the project. The Department classifies these crucial materials as “Tier 1” materials. The Department will only allow the Contractor to install a “Tier 1” material on the project when the Contractor satisfies both of the following conditions:

1. The Contractor furnishes the documents specified under the heading “Certification” in the MSTR of the Materials Manual.
2. The Certification Engineer approves that the certified material conforms to the specifications.

The Department will make payment according to the specifications for a “Tier 1” material only after the Contractor installs the approved material.

**Tier 2:** The Department will only allow the Contractor to install a “Tier 2” material on the project when the Contractor satisfies either of the following conditions:

1. The Contractor furnishes the documents specified under the heading “Certification” in the MSTR of the Materials Manual, or
2. The Contractor uses a material listed on the Approved Products List or furnished by a certified supplier.

The Department will make payment according to the specifications for a “Tier 2” material only after the Contractor installs the material.

**Tier 3:** The Department classifies a “Tier 3” material as those materials that require no documentation under the heading “Certification” in the MSTR of the Materials Manual. The Contractor may install a “Tier 3” material on the project at any time.

The Department will make payment according to the specifications for a Tier 3 material only after the Contractor installs the material.

### 6.2 Certification.

#### Definition.

Certification is the process by which a Contractor (Umbrella Certificate only), manufacturer, or supplier certifies or guarantees that certain products, materials, or items conform to the specifications. Certification may eliminate the need for

acceptance testing although the Department reserves the right to sample, test, and make final acceptance of materials after delivery to the project. The Department accepts the following certifications:

- A. Certificates.
- B. Certified Suppliers.
- C. Items on the Approved Products List.
- D. Umbrella Certificates.

The types of acceptable certifications are further discussed in this section.

The Contractor shall provide the appropriate form of certification, as required by the MSTR.

#### Operational Procedure.

Certification may be in the form of a report of test results or a statement of specification compliance for a material. It shall be signed by an authorized representative of the company.

Each type of certification must show the designation of each product for which the material is intended; the specific identification for each item, such as a batch, truck, car, heat, or lot number; and adequate reference to exactly determine the item and quantity represented.

Certifications may be submitted separately, or the information may be stamped or printed on shipping orders or included as part of the standard Bill of Lading.

Each certification shall be checked as received to determine that it contains the required information relative to the specifications and supporting data, and that it applies to the material supplied to the project. If the certification meets the requirements, and visual inspection of the material or product indicates conformity, it shall be dated and submitted to the Certification Engineer.

Certifications received by the Area Engineer directly from the manufacturer, fabricator, or supplier shall be placed in the project file. A copy shall be forwarded without delay to the Certification Engineer and reviewed, approved or rejected. When the letter of transmittal containing the assigned certification, number is received by the Area Engineer, it should be treated the same as a numbered test report. The project file should contain a record of certifications received from the supplier and their approval or rejection by the Certification Engineer.

When certifications are submitted directly to the Certification Engineer by the manufacturer, fabricator, or supplier, the original certification shall be forwarded to the Area Engineer to be placed in the project file. Notice of approval or rejection will accompany the original copy.

### 6.3 Certificates.

Written documentation stating that the specified material is in conformity with the pertinent specification requirements of the contract.

Materials delivered without the required certificates shall not be used pending receipt of certification or satisfactory test results.

Certificates may come in different forms. Acceptable forms that may be submitted include the following:

- A. Certificate of Compliance / Manufacturer's Certificate – A signed document from a manufacturer or supplier certifying that materials indicated on the document are in compliance with the contract and specifications.
- B. Certified Test Report – A signed test report from a mill or plant that certifies that materials were tested in accordance with a specific industry standard or test method. The report shall indicate the procedures followed and results obtained.
- C. Certified Statement – Department furnished forms (DOT-57, DOT-77, and DOT-97) required by the MSTR. The supplier/producer shall complete the form, sign it, and return it to the Inspector.

At a minimum, certificates shall include the information specified in paragraph 6.2, operational procedures and/or in paragraph "6.6, Definition".

### 6.4 Certified Supplier.

#### Definition.

A certified supplier is a fabricator, mill, or plant that does not have to furnish certificates for individual heat numbers, loads, lots, or shipments to the project. To become a certified supplier, a fabricator, mill, or plant must submit a statement to the Chief Materials and Surfacing Engineer, certifying that the material produced and supplied to all projects will conform to the specifications. This statement must be submitted at least once a year, prior to the first shipment to a project. It is understood that materials furnished by a certified supplier may be subject to testing at any time.

#### Operational Procedure.

A list of the fabricators, mills or plants which have been certified by the Chief Materials and Surfacing Engineer shall be compiled, maintained and distributed by the Certification Engineer for use by the Area Engineer. The list may be distributed with, or as part of the Approved Products List. The certified status for the supplier will be effective through December 31st of the year in which it is issued, unless revoked earlier. It may be reinstated as directed by the Chief Materials and Surfacing Engineer.

A. Certified Producer of Cement.

- (1) A statement signed by an authorized representative of the company, that the cement supplied to all projects will meet the specifications, with a request to be certified, will be submitted to the Chief Materials and Surfacing Engineer.
- (2) To be certified, the cement plant shall meet the requirements of SD 416.

B. Certified Fabricator of Reinforcing Steel.

- (1) A statement signed by an authorized representative of the company, that steel supplied to projects will meet specifications, shall be submitted to the Chief Materials and Surfacing Engineer. Certified copies of mill test results, representing the fabricator's steel stock on hand, shall be available in his file for review by the Chief Materials and Surfacing representative.
- (2) The certified fabricator's steel stock shall be randomly sampled by a representative of the Department of Transportation. The sample shall be obtained from steel represented by heat numbers or lots received since the previous sample was taken. The sample shall be submitted to the Central Testing Laboratory.
  - (a) When tests confirm non-specification material or product, the certified fabricator shall be notified of the deviation and may be removed from the certified list until the deviation and cause have been corrected to the satisfaction of the Chief Materials and Surfacing Engineer.
  - (b) Reinforcing steel supplied by a certified fabricator, which has not been subject to sampling at the Fabricator's plant, such as epoxy coated steel shipped directly to the project from the manufacturer and coater, shall be considered as supplied by a non-certified plant.
- (3) A certified fabricator shall forward to the Engineer for each shipment to the project, a record of the reinforcing steel lengths, shapes, and sizes. The information may be submitted as a copy of the bar list, shipping or packing list, or Bill of Lading.
- (4) A non-certified fabricator is required to forward to the Engineer, for each shipment of reinforcing steel to the project, a certified copy of the mill test report of chemical analysis and physical properties for each heat or lot number.

Deliveries to the project shall be identified by heat number and checked in the field against heat numbers appearing on certified analysis. Bars having heat numbers not covered by certified analysis shall not be placed in the work until certification is obtained.

C. Certified Lime Plant (Mill).

- (1) A statement signed by an authorized representative of the lime plant (Mill), that hydrated lime supplied to projects will meet specifications, along with the certified analysis most recently made in the plant's laboratory, shall be submitted to the Chief Materials and Surfacing Engineer with the request to be certified.
- (2) During production, the certified plant shall provide the Central Testing Laboratory, weekly certified analysis of its product, reporting the following:
  - (a) Percent calcium and magnesium oxide.
  - (b) Percent free water or mechanical moisture.
  - (c) Accumulative percentage, by weight, of residue retained on the #6, #20, and #100 sieves.
- (3) A sample shall be obtained at the plant on a random schedule, during production, by a representative of the Department of Transportation. The sample, with copies of results of tests made by the plant since the Department of Transportation's last sampling, shall be submitted to the Central Testing Laboratories.
- (4) The Central Testing Laboratory report shall include, as remarks, comparison of its test results with those of the plant for corresponding material.

When tests confirm non-specification material or product, the certified plant shall be notified of the deviation and may be removed from the certified list until the deviation and cause have been corrected.

6.5 Items on the Approved Products List.

Definition.

The Approved Products List is a record prepared, revised, maintained, and distributed by the Central Testing Laboratory. Items or brand name products qualified for the list are those which have developed and maintained a history of satisfactory results from acceptance tests and plant inspections and tests, or for which the Department has verified specification compliance and field performance. Certificates of Compliance will not be required for named products from the Approved Products List, unless otherwise specified.

- A. The list, by brand name, may contain such items as: Accelerators, air entraining agents, castings, concrete pipe (Release dates), epoxies, liquid membrane cures, paint, retarders, water reducing agents, metal products, wood products, etc.
- B. This method provides several items that the Contractor may order without a delay in testing.

- C. Items on the Approved Products List shall be tested in accordance with MSTR.
- D. The Area Engineer should contact the Region Materials Engineer or the Certification Engineer if there are questions about the Approved Products List.
- E. When inspections or tests reveal failing material or products, the producer will be notified by the Chief Materials and Surfacing Engineer of the deviations. Failure to take satisfactory corrective action within a specified time limit will result in suspension and removal from the Approved Products List.

#### 6.6 Umbrella Certificates.

##### Definition.

A single written document stating that the materials listed or the identified component materials of a system or assembly, including miscellaneous items, are in conformity with the pertinent specification requirements of the contract.

The certificate includes an entry for the following:

- A. Project number
- B. County.
- C. PCN number.
- D. Location.
- E. Contractor - Name and address.
- F. Subcontractor - Name and address. (If applicable)
- G. Component description.
- H. Certifying manufacturer of each component.
- I. Heat or lot number. (As applicable)
- J. Contractor signature, title, and date.
- K. Name, title, and date for individual preparing the document.

##### Operational Procedure.

Umbrella Certificates shall be submitted for items such as guardrail, lighting and traffic control, signing, chain-link systems and bridge drains as required by the MSTR. The information specified above shall be provided on Department furnished forms (DOT-99).

The Prime Contractor is responsible for completing the certificate. If a subcontractor is going to perform the work covered by the certificate, the subcontractor may fill in the information; however, the Prime Contractor must sign the certificate. Each component material that is to be included on the Umbrella Certificate will be identified as such on the DOT-14. The Prime Contractor will not be allowed to submit individual certification documents for the component materials in lieu of completing a DOT-99 form.

Materials certified by an Umbrella Certificate will be inspected to confirm that the proper materials are used and are installed according to the plans and specifications.

The Contractor shall furnish the Engineer with an original copy of the completed DOT-99 when the work begins. The Engineer shall verify that all materials shown as requiring Umbrella Certification on the DOT-14 are included on the form. A copy of the DOT-99 shall be forwarded to the Certification Engineer.

If a construction change order (CCO) is issued that affects items covered by an already submitted Umbrella Certificate, the Project Engineer will verify that the Umbrella Certificate is still an accurate representation of the items or materials required. Based on the Project Engineer's determination, the Prime Contractor may be requested to submit a revised Umbrella Certificate to reflect the changes to the contract.

Payment for the materials or components will be made only after approval of the Umbrella Certificate by an appropriate Department representative and the materials have been installed on the project.

#### **6.7 Verification Methods.**

The methods by which the Department determines the acceptability of materials to be placed on the project include the following:

- A. Sampling and Testing – Some materials may require samples be taken and tests performed to determine that the material being certified is in conformity with the plans and specifications. Materials to be sampled and/or tested will be identified in the MSTR.
- B. Documented Inspection – Inspection will be performed as necessary to verify conformance with specifications. Inspection may include taking measurements, performing calculations, and verifying the condition of materials furnished to the site. Inspection may also consist of verifying that materials furnished to the site are representative of those materials identified by certification documents. Documentation of the inspection is to be included in the diary or on the CM&P system, or on forms provided for a particular material.
- C. Random Audit of Contractor's Records – Verification of Contractor's ability to produce the required certifications. The Prime Contractor must build and maintain a file of the identified certifications and retain them for a period of three years after the final payment is received on the project. If any litigation, claim, negotiation, audit or other action involving the records has been started before the expiration of the 3-year period, the records must be retained until the completion of the action and resolution of all issues which arise from it, or until the end of the regular 3-year period, whichever is later.

The records shall be available for review upon request by the Department. Beginning on the date that the Department receives the completed DOT-99 form, random audits of certification records may be conducted by Department personnel. The purpose of the audits is to verify that the contractor is maintaining the proper paperwork.

- D. Annual Inspection of Suppliers – On an annual basis, the Department will randomly select projects and conduct audits of certified suppliers. Random

visits of supplier plants or fabricator shops are intended to verify that the facilities meet Department standards.

## **7. Computations and Reports:**

### **7.1 Report.**

Each required field test shall be recorded in the Materials, Sampling, and Testing system (MS&T). If test report is not available in MS&T, the test shall be documented as determined by the Region Materials Engineer.

The Region and Central Testing Laboratories shall retain the original reports of tests performed in their respective laboratory.

The original copy of tests or worksheets made by the Area Engineer, but not entered into MS&T system shall be retained in the project file. These tests will be made available to the Region Materials Engineer upon request.

The Contractor shall be advised immediately of all test failures (refer to RSTC 5 Identification).

Reports of test results shall be recorded only as the whole number or decimal required by the specification, e.g., for a specification requirement: "10-35% passing #40 sieve", the report need only show the percent (As a whole number) passing the #40 sieve.

### **7.2 Computations.**

Computations shall be carried one place beyond the reporting figure, and all test results shall be reported to the whole number or decimal required by the specification.

Rounding from the computations to the reporting figure shall be the last step in calculating the test results.

When the requirement appears as a fraction, that fraction shall be interpreted as a decimal rounded to the nearest one hundredth (0.01) for computations.

Discrepancies may arrive between hand calculations and MS&T computations. In these instances, the results in MS&T shall govern.

#### **Rounding.**

If the first digit after the digit to be retained has a value of less than 5, the retained figure is not changed. If the first digit after the digit to be retained has a value of 5 or more, the digit to be retained is increased by one. No result, whether intermediate or final shall be rounded more than once.

Compliance will be based upon interpreting the reporting results as though they were rounded to the terms (whole numbers, decimals, or fractions reduced to decimals) of the specification. Thus, the minus #200 material reported as 8.4% shall be considered having no deviation from specifications that require 4–8%



passing the #200 sieve. It would, however, be a deviation from specifications requiring 4.0–8.0% passing the #200 sieve.

**8. Availability and Filing:**

**8.1 Acceptance Samples and Tests.**

Original reports of acceptance sampling and testing not entered into the MS&T system, are to be retained in the Project Engineer's file and made available for examination by the FHWA Engineer. The reports shall show the source of the samples and where, when, and by whom the sampling and testing was done. These test reports shall remain part of the official project record. Results of acceptance tests need not be submitted to the FHWA, unless specifically requested.

**8.2 Independent Assurance Samples and Tests.**

Test reports of the IA sampling and testing are to be made available in the Region Laboratory and the project file for examination by the FHWA inspecting Engineer.

Results of IA tests made by Central Testing Laboratories shall be forwarded to the participating Region or Area Laboratory with copies filed in the appropriate Region Materials and Central Testing Laboratory offices.

Results of tests made by the Central Testing Laboratories on comparative samples submitted by AMRL and CCRL, and the reports of the test equipment and procedure inspections made by those organizations are to be filed in the Central Testing Laboratory Office.

Test reports of the IA sampling and testing need not be submitted to the FHWA Division Office, unless requested.

**9. Electronic Reports and Filing:**

In lieu of paper test reports, forms and worksheets, SDDOT reports can be completed electronically in the SDDOT Materials, Sampling, and Testing system (MS&T). Electronic tests, forms and reports which are created and available in the MS&T system are acceptable as filed electronically and do not need to be placed in the project file. Electronic copies stored on the MS&T system are acceptable as signed documents.