

Materials Manual, Sampling, and Testing Procedures

Preface

PURPOSE:

This Materials Manual has been prepared for the purpose of standardizing the Department's sampling and testing procedures and to provide assurance that the materials and workmanship incorporated in each construction project are in reasonably close conformity with the requirements of the plans and specifications.

The Chief Materials and Surfacing Engineer will be responsible for final interpretation of the contents of this manual and shall be consulted if clarification is necessary.

The following sampling and testing procedures are used by the Department.

1. Tests that follow the national standard without modification.
2. Tests which have been modified by the Department laboratory which contain portions of a national standard.
3. Tests developed by the Department Laboratory without reference to a national standard.

The use & distribution of Materials & Surfacing Forms list, along with the most recent forms being used, is kept electronically by the office of Materials & Surfacing. The Approved Products List & certified plants list are maintained on the internet. A list for various approved concrete mix designs is kept electronically by the office of Materials & Surfacing. The mix design approved for a specific project is also kept in the project files. The asphalt mix designs are kept by the Bituminous Mix Design Office and in the project file. All of these lists are updated as changes occur.

LABORATORY INSPECTING PROGRAM:

The Department participates in a regular laboratory inspection and comparative sample testing program with the AMRL and CCRL.

Annual inspections and a comparative sample testing program has been established by the Central Laboratory with the Region Materials Laboratories.

A continuous inspection and comparative sample testing program is maintained between the Region Materials and the Area Engineer's project laboratories.

SAMPLING AND TESTING PROGRAM:

Minimum Sample and Test Requirements:

1. The schedules represent the minimum requirements for sampling and testing for each project. Good engineering practice may necessitate more frequent testing to assure adequate control. For example:
 - (a) At the beginning of a project.
 - (b) When a low volume of work is performed over a long period of time.
 - (c) Whenever borderline or questionable material is encountered.
2. When project quantities are too small to justify sampling and testing costs, or when small quantities of material used will not have a significant influence on performance, strength or durability of major items on construction, or when large quantities of material of known satisfactory history are used, a request may be made to the Chief Materials and Surfacing Engineer, through the Region Materials Engineer, for permission to reduce or eliminate the Minimum Sample and Test Requirements (MSTR).
3. The sample and test requirements are stated in quantitative units and shall be considered to be followed by the words "Or a portion thereof".
4. Acceptance of some small quantities of miscellaneous materials may be made on the basis of the manufacturer's material certification or by visual inspection as outlined in the schedule of Minimum Sample and Test Requirements (MSTR) or as directed by the Chief Materials and Surfacing Engineer.

LOCATION FOR OBTAINING SAMPLES AND TESTS:

Samples and tests for acceptance and independent assurance (IA) shall be taken from the completed work, if practicable; or from the point nearest the finished product, prior to or following blending, that representative specimens of the specified material can be obtained or as stated on the plans. Acceptance and independent assurance (IA) samples to be submitted to the Central Laboratory shall be taken as soon as the material is available on the project.

The use of the random numbers table shall be used, where applicable, for any random sampling and testing.

TERMINOLOGY AND ABBREVIATIONS:

Titles having a masculine gender, such as he, his, him, are utilized for the sake of brevity and are intended to refer to persons of either sex.

Whenever the following abbreviations are used, they are to be construed the same as the respective expressions.

| | | |
|-------------------|---|--|
| π | = | 3.1416 |
| AASHTO | = | American Association of State Highway and Transportation Officials |
| APL | = | Approved Products List |
| AMRL | = | AASHTO Materials Reference Laboratory |
| ASTM | = | American Society for Testing and Materials |
| AWPA | = | American Wood Preserver's Association |
| °C | = | Degrees Celsius |
| CCGP | = | Calcium Carbide Gas Pressure |
| CCRL | = | Cement and Concrete Reference Laboratory |
| cm | = | Centimeter |
| CM&P | = | Construction, Measurement, & Payment system (Software) |
| cu.ft. | = | Cubic Foot |
| cu.yd. | = | Cubic Yard |
| cwt. | = | Hundred Weight |
| Dia. | = | Diameter |
| DTI | = | Direct Tension Indicator |
| DOT-# | = | South Dakota Department of Transportation form number |
| °F | = | Degrees Fahrenheit |
| F&E | = | Flat & Elongated |
| FAA | = | Fine Aggregate Angularity |
| FHWA | = | Federal Highway Administration |
| ft ² | = | Square Foot |
| ft ³ | = | Cubic Foot |
| F.M. | = | Fineness Modulus |
| g | = | Gram |
| Gmb | = | Bulk Specific Gravity |
| Gmm | = | Theoretical Maximum Specific Gravity |
| Gsb | = | - #4 Bulk Specific Gravity |
| Gse | = | Effective Specific Gravity of the Mineral Aggregate |
| Hg | = | Measurement on a vacuum of residual pressure in mercury |
| IA | = | Independent Assurance |
| IPCEA | = | Insulated Power Cable Engineers Association |
| JMF | = | Job Mix Formula |
| k | = | Kilo |
| kg | = | Kilogram |
| kg/m ² | = | Kilogram Per Square Meter |
| kg/m ³ | = | Kilogram Per Cubic Meter |
| km | = | Kilometer |
| kPa | = | Kilopascals |
| L | = | Liter |
| lbs. | = | Pounds |

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|----------------------|---|---|
| lbs./ft ² | = | Pounds Per Square Foot |
| lbs./ft ³ | = | Pounds Per Cubic Foot |
| Lin. | = | Lineal |
| L.L. | = | Liquid Limit |
| m | = | Meter |
| m ² | = | Square Meter |
| m ³ | = | Cubic Meter |
| Max. | = | Maximum |
| mL | = | Milliliter |
| mm | = | Millimeter |
| MPa | = | Megapascals |
| MS&T | = | Materials, Sampling, & Testing system (software) |
| MSTR | = | Minimum Sample & Test Requirements |
| mton | = | Metric Ton |
| NEMA | = | National Electrical Manufacturers Association |
| # / No. | = | Number |
| N.P. | = | Non-Plastic |
| oz. | = | Ounces |
| Pa | = | Pascals |
| Pba | = | Percent Asphalt Absorption |
| Pbe | = | Percent Effecting Asphalt Content |
| PCC | = | Portland Cement Concrete |
| PCF | = | Pounds Per Cubic Foot |
| pH | = | The hydrogen ion concentration expressed in units |
| P.I. | = | Plasticity Index |
| P.L. | = | Plastic Limit |
| ppm | = | Parts Per Million |
| psi | = | Pounds Per Square Inch |
| RAP | = | Recycled Asphalt Pavement |
| QA | = | Quality Assurance |
| QC | = | Quality Control |
| qt. | = | Quart |
| RPM | = | Revolutions Per Minute |
| RSTC | = | Required Samples, Tests, & Certificates |
| SDDOT | = | South Dakota Dept. of Transportation |
| SD # | = | South Dakota test number |
| UL | = | Underwriters Laboratory |
| Us | = | Uncompacted Voids |
| Va | = | Percent Air Voids |
| WAP | = | Water Asphalt Preferential |
| Wt. (wt.) | = | Weight |
| yd | = | Yard |
| yd ² | = | Square yard |
| yd ³ | = | Cubic yard |