

Chapter 2 – Division of Materials Testing Overview

The Division of Materials Testing, which consists of the Hot Mix Asphalt Section, Concrete - Steel Section, and the Chemical/Aggregate Section, is under the jurisdiction of the Director of Research and Materials (DRM). The DRM is assisted by three Transportation Supervising Materials Testing Engineers who lead the Chemical/Aggregate Section, Concrete and Steel Section, and Hot Mix Asphalt Section, and a complement of approximately 50 employees. The organization of the Division of Materials Testing is graphically represented in the following Organizational Chart. (Figure 1.)

It is the responsibility of the Director of Research and Materials, to supervise the operations of the three testing Sections in order to assure that materials are approved and/or rejected in accordance with the specified sampling and testing procedures consistent with sound engineering judgment. This information is recorded on the computer-based construction reporting system (Sitemanager- an AASHTOware product) resident on the Department's computer network for dissemination to the appropriate construction project and District personnel. It also serves as a historical list of all materials used on a project and their status. This information is used at the end of a project to determine that adequate acceptance and assurance testing was done for the quantities used on the project. Appendix D lists the material codes used with the computer-based system.

It is also the responsibility of the DRM to issue a final materials certificate at the completion of a project; and to supervise the operations such that the personnel policies, affirmative action goals, union contracts, code of ethics, and other pertinent Department guidelines/policies are brought to the attention of and enforced by each individual Section within the Division of Materials Testing.

The Director of Research and Materials, as a member of AASHTO and ASTM, advises and assists in the preparation and continuous revision of AASHTO and ASTM specifications used by the Department.

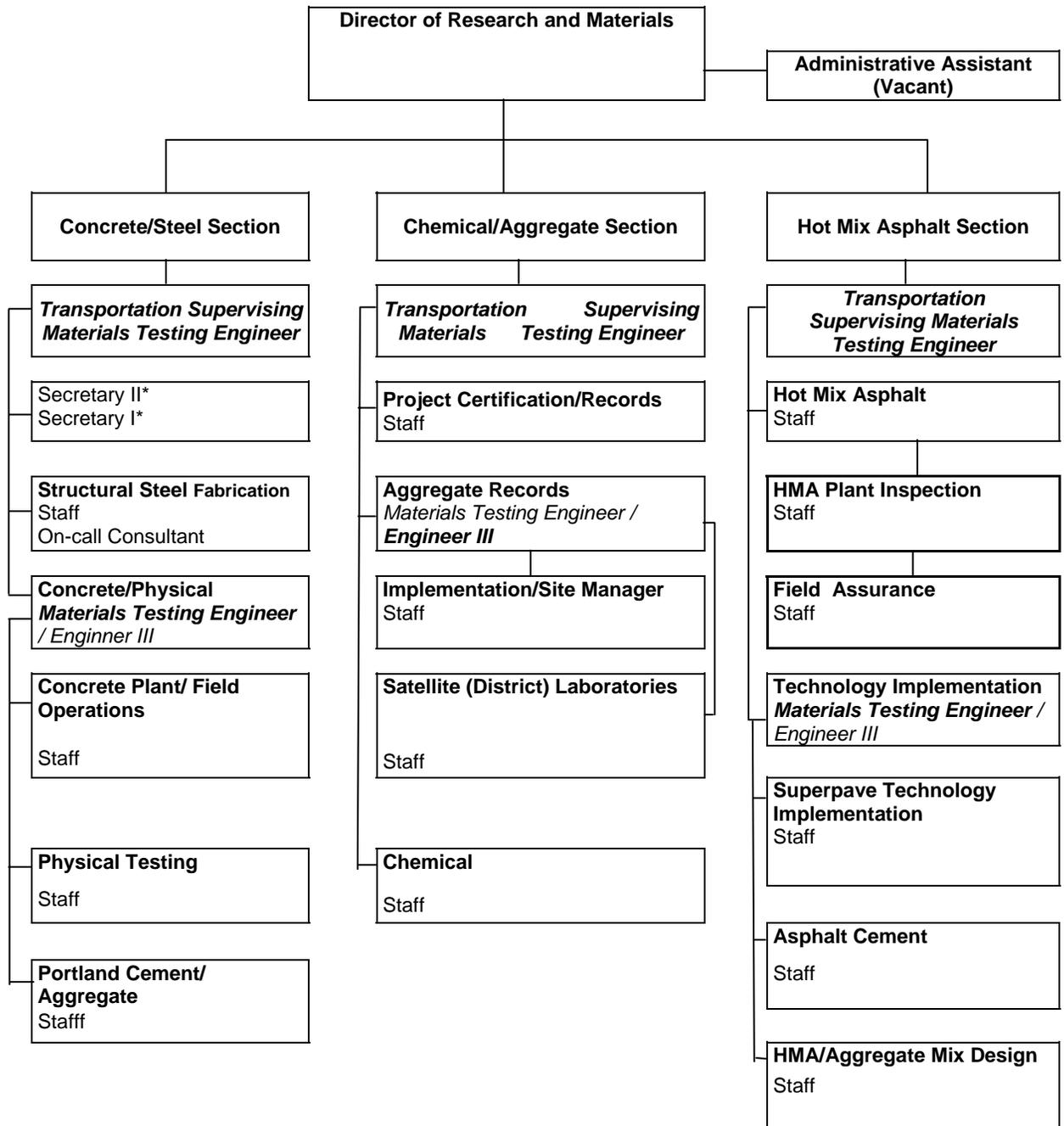
The Director of Research and Materials maintains an association with Materials Testing Engineers of other states through AASHTO correspondence and their annual meeting and maintains a close association with the surrounding states Material Testing Engineers through correspondence and meetings with the Northeastern States Materials Engineers Association. He also maintains a close relationship with professional organizations such as American Concrete Institute (ACI), New England Transportation Technician Certification Program (NETTCP), Northeast Asphalt User Group (NEAPUG), National Transportation Product Evaluation Program (NTPEP), Northeast Protective Coating Committee (NEPCOAT), and the Association of Asphalt Paving Technologists (AAPT).

The duties of the three Supervising Materials Testing Engineers include: the establishment of standards for the chemical and physical testing of all materials used by the Connecticut Department of Transportation; recommendation for approval or rejection of all materials tested; initiation of research into new and/or improved materials, test methods and equipment; the development of new procedures and equipment for testing; the preparation and review of detailed technical reports; submission of budget, equipment and overtime requirements; investigation of materials failures; and to confer with contractors and engineers on materials specifications and problems. It is also the responsibility of the three supervising engineers to collectively prepare a final materials certificate at the completion of any project.

The Division of Materials Testing participates in the AASHTO Accreditation Program (AAP). This program provides accreditation for laboratories that meet strict organization, personnel, equipment and testing proficiency requirements.

The program includes the following construction materials pertinent to the Division of Materials Testing:

- Asphalt Cement
- Performance Graded Binder
- Cut-back Asphalt
- Emulsified Asphalt
- HMA
- HMA Aggregate
- Portland Cement Concrete
- Portland Cement Concrete Aggregate



* Administratively reports to Concrete/Steel Section – functionally to all three sections.

FIG. 1
 ORGANIZATIONAL CHART
 October 2003

Division of Materials Testing Overview (cont.)

CHEMICAL/AGGREGATE SECTION

The Chemical/Aggregate Section of the Division of Materials Testing is divided into three functional areas that are described as the Project Certification/Records Unit, Field Assurance/Satellite (District) Laboratories, and the Chemical Testing Laboratory.

Project Certification/Records Unit

This unit is responsible for tracking material testing on a project and ensuring that all material permanently incorporated into the project is tested/certified in sufficient quantity and that the results are acceptable or alternative acceptance criteria are met. Upon request from the District, a final materials certificate is provided for all completed projects stating the disposition of all materials incorporated into the project. If applicable, exceptions to the project specifications are listed individually on the certificate. Examples of this certification are located in Appendix B.

Satellite (District) Laboratories:

This unit oversees the operations of the four Satellite Laboratories located in each of the four Districts. These laboratories are located in each District to expedite the sampling and testing of common materials.

The unit is also responsible for maintaining an active independent assurance testing program for the Central and District Laboratories as required by the Federal Highway Administration (FHWA).

Chemical Unit:

This unit is responsible for analyzing chemical/physical properties of materials used by the Department. These materials include the following: portland cement, steel, epoxy, admixtures, paint (traffic, bridge), glass beads, purity of calcium and sodium chloride, limestone, hydrated lime, rope, chloride analysis of hardened concrete, topsoil, peat moss, hay and fiber mulch, wood chips and other related materials.

This unit is also responsible for performing Toxicity Characteristic Leaching Procedure (TCLP) on abrasive blast debris used to remove lead based paints from structural steel bridge structures. These materials are analyzed by wet chemical methods as well as instrumentation utilizing atomic absorption, gas chromatography, infrared spectrophotometry, ultra violet spectroscopy and carbon - sulfur analysis.

CONCRETE/STEEL SECTION

The Concrete Steel Section is divided into four functional subsections: Structural Steel Fabrication; Physical Testing, Cement and Aggregate; Concrete Plant and Field Operations.

Structural Steel Fabrication - This unit has the responsibility to assure that all materials and physical aspects of structural steel fabrication are in compliance with the applicable specifications. This operation is accomplished by Division of Materials Testing personnel and assisted by personnel through a contractual agreement with an approved private testing agency. It is the duty of this unit to prepare and monitor this contract on day-to-day basis, and ensure compliance to it. Personnel in this unit are also responsible for the review and processing of the inspection reports and making recommendations to the Supervising Materials Testing Engineer and managers of the testing agency. Additional duties of this subsection include the review and approval of shop and field welding procedures, assistance to other divisions regarding welding techniques and procedures, on-site audits of field welding; testing and certification of Department approved welders; and any related duties as they apply to structural steel fabrication.

Physical Testing - The responsibilities of the physical testing unit include the testing for compressive strengths of concrete cylinders, testing of drilled cores, properties of brick and block, the tensile strengths of several ferrous and nonferrous structural steel products, the Rockwell or Brinell hardness of structural steel products, the coating thickness of zinc and epoxy coated products, and weld coupons for certification testing. This subsection also performs related testing on new products and materials being investigated by the Department.

Portland Cement and Aggregate - This unit is primarily responsible for the testing of portland cement, concrete sands, concrete patching materials, nonshrink grouts, preformed expansion joint fillers, concrete joint sealers, hydrated masonry lime, and blasting sand or related material. Additionally the subsection performs testing on cubes and slant shear blocks that are prepared from materials used in the field. The plasticity index of impervious fills and clays is determined. Related testing on new products and materials is also performed as required.

Concrete Plant/Field Operations - Inspectors in this unit are responsible for the quality assurance of concrete products fabricated for the Department. These products include reinforced concrete pipe, precast and prestressed concrete items. The duties of the individual inspectors are to sample all component materials for compliance testing, inspection of the casting beds and forms to ensure dimensional conformance to the approved drawings, observance of the concrete batching operation to ascertain conformance to an approved mix design, witnessing of all required test performed on the plastic concrete, monitoring of the concrete placement and consolidation operation, witnessing the testing of compression specimens to determine the hardened concrete strength, inspecting the finished product for conformance to all dimensional tolerances and finished appearance standards, and the maintenance of complete and accurate records of all phases of the work. Consultant testing personnel under contract to the Department are used as needed to supplement DMT personnel to meet this responsibility.

HOT MIX ASPHALT SECTION

The Hot Mix Asphalt Section is divided into five functional units: Field Assurance, Asphalt Cement, Hot Mix Asphalt/Aggregate Mix Design, Plant Inspection and Superpave Technology Implementation.

Field Assurance - This unit is comprised of two subsections, each under the direction of a Materials Technician III who has specialized training and experience in the production, testing and placement of HMA mixes, and who is a working supervisor. One supervisor has various responsibilities that includes daily field supervision of the HMA field technicians and observation of their sampling and testing techniques; plant and field laboratory inspections to identify problems; working with producers to solve material problems when necessary; performing assurance sampling and testing as specified; training new personnel and reviewing procedures and specifications with the field technicians; serving as a liaison with the material source, the job site and the HMA section to remedy material and/ or related problems; and working closely with the HMA/Aggregate Mix Design unit to carry out production and investigative tasks. The other supervisor is responsible for the supervision of technicians performing HMA density testing in accordance with the annual HMA Materials and Bridge Deck Membrane Waterproofing Materials Complete-In-Place contract; the assurance testing of HMA and soils as required on construction projects; the maintenance of the Nuclear Regulatory Commission License for the Department and maintaining all records required under the Nuclear Regulatory Commission and the Department of Environmental Protection; the calibration of all nuclear gauges used on State projects; training and certifying all users of ConnDOT nuclear density gauges; and the general maintenance of all ConnDOT gauges.

Asphalt Cement - This unit is responsible for quality assurance of various performance graded binders and other petroleum based products. HMA paving and associate products tested are asphalt cements, emulsions, cut-back asphalts and component materials used in membrane

waterproofing systems on new bridge and bridge deck rehabilitation projects. Other materials tested by this unit are hot-poured joint sealers, dampproofing asphalts, pipe joint compound, and fuels for heating and diesel engines. This unit also performs absorption recovery tests on production mixtures, pavement samples and Recycled Asphalt Pavement (RAP).

Hot Mix Asphalt/Aggregate Mix Design - This unit is responsible for verifying that mix designs are in compliance with specifications. At the Central Laboratory, daily testing is performed on test specimens that are molded at Hot Mix Asphalt plants by the field technicians. Detailed records are maintained for each mixture produced and tested for every active vendor. The Hot Mix Asphalt Mix Design unit also performs extraction and gradation tests on submitted field samples; processes core samples as required; and investigates new mix designs, additives and aggregates.

HMA Plant Inspection - This unit is responsible for quality assurance of all HMA material used on construction and maintenance projects. Approximately forty source locations provide Hot Mix Asphalt mixtures for State projects. Each has a field laboratory that provides the field technician immediate, on-site test results to implement a quality assurance program to ensure high quality material as specified. In addition to the sampling and testing of Hot Mix Asphalt mixtures at the production site, the field technicians sample Performance Graded Binder, observe the production process; inspect fine and coarse aggregates; verify batch weights, mix temperatures and general mix appearance; check plant machinery and hauling vehicles for specification compliance. Field technicians maintain test records at each field laboratory and complete all applicable DMT forms, which they submit for processing.

Superpave Technology Implementation – This unit is responsible for the implementation of Superpave technology as it applies to Hot Mix Asphalt. This includes the review and implementation of new specifications and the design and verification of Superpave mix designs.

CARE IN SAMPLING

Laboratory personnel regularly sample both fine and coarse aggregates, aggregate blends for roadbase applications, and other various materials used for Construction and/or Maintenance purposes. On a less frequent basis, these personnel also oversee the field sampling of aggregates and plastic PC Concrete by construction inspection personnel as required for assurance purposes. The frequency of these tests are included in Chapter 7 as well as a description of the sampling and testing practices utilized by the DMT.

Sampling is a critical component of testing and is performed in accordance with the applicable specification indicated under “sampling” in each section of this manual. DMT personnel collecting samples will utilize every precaution to obtain samples that are truly representative of the nature and condition of the material to be sampled. DMT personnel are certified in the applicable sampling procedures through NETTCP (New England Transportation Technician Certification Program) and qualified by established procedures as described in *appendix H* to assure uniform procedures in obtaining representative samples.

DMT personnel also regularly transport field samples to the central or satellite laboratories for testing. It is also important that samples are carefully handled and transported to prevent damage to the samples. Containers used to transport samples should be clean and adequate for the particular material being sampled. Furthermore, the containers should be durable and of a type and size that prevents loss, damage, or contamination of any portion of the sample.

It is not possible to overemphasize the need for the careful and judicious selection of a sample. A test report is worthless unless the sample has been properly obtained and is truly representative of the material sampled. No matter how precisely the laboratory test is carried out, if the sample is poorly obtained, false results will be reported. Proper sampling results in fairness to the producer, the contractor and the State. An improper sample may cause unnecessary delay in the

completion of the job and may later prove embarrassing to the State. It is the responsibility of the technician taking the sample to see that it is representative of the material being sampled, and to take all precautions to insure that it will remain such until tested.