



# Quality System Manual

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## **SECTION 1 - INTRODUCTION**

### **Purpose**

The Code of Federal Regulations (CFR), Title 23, Part 637(B) includes a mandatory requirement for all State Highway Agencies (SHAs), including the Department, to maintain a central laboratory accredited by or recognized by the [American Association of State Highway and Transportation Officials \(AASHTO\) Accreditation Program \(AAP\)](#).

The Department's central laboratory, organizationally part of the Materials and Tests Division (MTD), seeks accreditation through one of the following FHWA accreditation bodies CMEC, L-A-B, or AASHTO (re:source and CCRL). It currently maintains accreditation through the AAP. This includes meeting the minimum requirements set forth in 23 CFR 637(B) and AASHTO R 18, *Standard Recommended Practice for Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories* (herein referred to as "R18").

## **SECTION 2 - CENTRAL LABORATORY ACCREDITATION**

MTD's *Quality System Manual* (QSM) describes and references the policies, procedures, personnel requirements, organizational structure, and records that comprise the Materials and Tests Division's (MTD) [Quality System Program](#) (QSP) in accordance with the above referenced requirements.

### **2.1 AASHTO re:source and Cement and Concrete Reference Laboratory (CCRL)**

The central laboratory also maintains accreditation with the AAP who evaluates the capabilities of the construction testing laboratories through laboratory assessment and proficiency sample services provided by AASHTO re:source and the Cement and Concrete Reference Laboratory (CCRL). (See Section 6, *Test Records and Reporting*.)

AASHTO re:source is guided by R18. Accreditation requirements for MTD's Quality System Program are contained in R18, the laboratory quality standards ASTM D3666 (Asphalt, Hot Mix, Aggregates), and ASTM D3740 (Soils).

AASHTO re:source laboratory qualification standards pertain to:

- Asphalt Cements and Emulsified Asphalts,
- Hot Mix Asphalt (HMA),
- Soils and Aggregates, and
- Calibration.

CCRL accreditation requirements for the central laboratory's quality system are contained in the laboratory quality standards ASTM C1077 (Concrete); ASTM C1222 (Cement); ASTM C114 (Chemical Analysis of Hydraulic Cement); and ASTM A615, A616, A617, E8, and A370 (Steel Reinforcing Bars).

Unlike AASHTO re:source, CCRL is not under the guidance of AASHTO R 18. Instead, it follows the quality requirements in ASTM C1222 and ASTM C1077. CCRL laboratory qualification standards pertain to cement, concrete and steel reinforcing bars.

### **2.2 ASTM/AASHTO Standards**

The American Society for Testing and Materials (ASTM) and the AASHTO Standard Specifications and Standard Test Methods are the basis for the central laboratory's accreditation.

ASTM standards are available electronically via the [Materials and Tests Division's intranet page](#); under "Quick Links," click on "ASTM."

### **2.3 Laboratory Assessment Program (LAP)**

AAP requires mandatory participation in the [Laboratory Assessment Program](#) (LAP) and the [Proficiency Sample Program](#) (PSP). (Also see Section 6, *Test Records and Reporting*.)

The LAP consists of on-site assessments as they pertain to AASHTO re:source and CCRL functions. The purpose is to determine how well the laboratory complies with accreditation requirements. The assessment includes a review of the laboratory's quality management system for compliance with R18. Full participation in the LAP program is required for accreditation, i.e., a laboratory does not become accredited merely by being assessed.

AASHTO re:source and CCRL on-site assessments are independent of one another and occur approximately every 2 yr. Before the assessment, MTD receives a letter from the accreditation entity to verify if any changes have occurred to the scope of accreditation. MTD provides a written response back, and then receives a date the on-site assessment will occur (60-day advance notification).

During on-site assessments, the CCRL/AASHTO re:source Assessors (Inspectors) evaluate the equipment, procedures, and quality system to verify compliance.

## **SECTION 3 - ORGANIZATIONAL STRUCTURE AND SECTION RESPONSIBILITIES**

### **3.1 Legal Name, Address, and Location of TxDOT's Central Laboratory**

Physical Location (not a mailing address)

Texas Department of Transportation  
Materials and Tests Division, (MTD)  
9500 North Lake Creek Parkway, Building 51  
Austin, TX 78717

Mailing Address

Texas Department of Transportation  
Attn: Materials and Tests Division, Building 51  
125 East 11th Street  
Austin, TX 78701-2483

### **3.2 Organizational Charts and Section Responsibilities**

- [TxDOT Organization Chart](#)
- [Materials and Tests Division's Organization Chart](#)
  - Quality Assurance Program Group
  - Coatings and Traffic Materials Section
  - Flexible Pavements and Asphalt Section
  - Soils and Aggregates Section
  - Rigid Pavements, Chemical, and Concrete Materials Section
  - Prefabricated Structural Materials Section

MTD offers the following technical services:

- quality assurance of certain materials used in highway construction and maintenance to ensure Specification compliance;
- quality monitoring of aggregates, cement, and fly ash;
- inspecting work performed in structural steel products fabrication plants, precast concrete product fabrication plants, limestone rock asphalt material plants, and certain commercial material plants producing crushed stone and bituminous mixes;
- Material Producer Lists (MPL) which includes testing and monitoring materials for approved warehouse storage, and project acceptance use;
- administering the Department's Quality Assurance Program;
- technical assistance in developing and implementing procedures for the safe use of nuclear devices;
- safe chemicals and hazardous waste disposal;
- technical assistance in the proper selection and use of materials in construction and maintenance projects;
- core drilling service to the Districts for concrete pavement depth tests;
- development and maintenance of test procedures;
- reviewing commercial laboratory agreements;
- Certification oversight and development;
- assisting with product evaluation;
- forensic evaluation;
- research project RTI and IAC; and
- support services such as equipment calibration.

### **3.3 Affiliations**

MTD participates in the following material committee work and cooperative projects.

- American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Materials (SCOM)
- Western Association of State Highway and Transportation Officials (WASHTO) Materials Committee
- American Society for Testing and Materials (ASTM)
- Association for Materials Protection and Performance (AMPP)

- Multi-Regional Training and Certification (MTRAC)
- Transportation Curriculum Coordination Council (TC3)

### **3.4 Organizational Structure, MTD**

MTD is divided into the following areas.

- Administration
- Quality Assurance and Calibration
- Coatings and Traffic Materials Section
- Flexible Pavements Section
  - Bituminous Branch
  - Asphalt Binder Branch
- Soils and Aggregates Section
- Rigid Pavements and Concrete Materials Section
- Prefabricated Structural Materials Section (Austin Headquarters)
  - Dallas/Fort Worth Field Office
  - Houston Field Office
  - San Antonio Field Office
  - Victoria/Eagle Lake Field Office
  - Waco Field Office

#### **3.4.1 QA Programs and Calibration**

Responsibilities of MTD's QA Programs and Calibration include:

- assist in directing operation of MTD;
- managing the Department's (QAP) [Quality Assurance Programs](#);
- maintaining electronic ASTM / AASHTO Standards and a data file on products evaluated;
- coordinating research activities within the Section and serving as a liaison for MTD Departmental research activities for ASTM, AASHTO, and WASHTO;
- overseeing the calibration functions for Division and District laboratories;
- reviewing the testing facilities of commercial laboratories and others who test materials for the Department;
- maintaining the Department's test procedures in the [Tex-900-K](#) Series; and
- liaison with FHWA on program compliance and oversight.

### Helpful Contacts – QA Programs and Calibration

Position	Name	Phone No.	Specialty, Notes
MTD Section Deputy Director	<a href="#">Enad M. Mahmoud, P.E.</a>	(512) 506-5843	Directing Technical Operations
Engineering Project Support	Claudia Izzo, P.E.	(512) 506-5816	Quality Assurance Programs (QAP), Design Build (DB)
Metrology Lab	Simon Vazhakadavil, EIT	(512) 506-5973	Calibration Lead 900-K Series
Quality System / IA Program Manager	Thomas L. Smith, III	(512) 506-5802	Quality Assurance Programs (QAP), Design Bid Build (DBB) AASHTO Accreditation Program (AAP) Proficiency Sample Program (PSP) Independent Assurance Program (IA) Laboratory Assessment Program (LAP)

### 3.4.2 Coatings and Traffic Materials Section

Responsibilities of the Coatings and Traffic Materials Section include:

- providing management and oversight of the structural coating's inspection consultant contract.
- providing management and oversight of the Pavement Marking Mobile Retroreflectivity Verification Program; and
- testing and inspection of:
  - sign face materials,
  - thermoplastic and prefabricated pavement markings,
  - traffic paint and traffic beads,
  - concrete sealers and coatings,
  - structural steel coatings,
  - traffic markers and buttons,

- liquid membrane-forming compounds for curing concrete, and
- maintaining the Department’s test procedures in the [Tex-800-B](#) Series.

**Helpful Contacts – Coatings and Traffic Materials**

Position	Name	Phone No.
Section Director	Johnnie Miller, P.E.	(512) 506-5841
Laboratory QA	John Basset, P.E.	(512) 506-5976

**3.4.3 Flexible Pavements Section**

Responsibilities of the Flexible Pavements Section include:

- in-plant sampling and laboratory control of asphaltic materials;
- managing and approving the Material Producer List (MPL) and Asphalt Binder Quality Program (ABQP) for approved producers and sources;
- in-plant inspection of limestone rock asphalt, bituminous mixtures, and surfacing aggregates at certain commercial plants;
- testing of bituminous aggregates, mixtures, liquid asphalt materials, and pavements; and
- maintaining the Department’s test procedures in the [Tex-200-F](#) and [Tex-500-C](#) Series.

The Flexible Pavements Section is headquartered in Austin, with the following field laboratories:

- San Marcos (Hunter),
- Chico (Bridgeport), and
- Uvalde.

**Helpful Contacts – Flexible Pavements and Asphalt**

Position	Name	Phone No.
Section Director	Travis Patton, P.E.	(512) 506-5841
Bituminous Laboratory Branch Manager	Melissa Benavides, P.E.	(512) 506-5976
Asphalt Laboratory Branch Manager	Pravat Karki, P.E.	(512) 506-5217

Bituminous Engineering Assistant	Marta Czarnecka Stephens, EIT	(512) 506-5908
Bituminous Material Process Inspector	Justin Okorochoa	(512) 506-5833
Bituminous Material Process Inspector	Mark Crawford	(512) 506-5833
Asphalt Engineer	Mohammad Ilias	(512) 705-1911
Asphalt Engineering Assistant	Zahra Sotoodeh Nia	(512) 506-5803
Asphalt Material Process Inspector	Maria de la Rosa (Pilar)	(512) 865-9754
Hotmix Proficiency Program	Mason Crawford	(512) 506-5833

### 3.4.4 Soils and Aggregates (S&A) Section

Responsibilities of the S&A Section include:

- testing and evaluating soils, flexible base and aggregates;
- administering the Aggregate Quality Monitoring Program (AQMP);
- performing geological and petrographic analysis for the Division and others in the Department, when requested;
- maintaining the Department's test procedures in the [Tex-100-E](#) and [Tex-400-A](#) Series; and
- managing the Department's Radiation Safety Program.

#### Helpful Contacts – Soils and Aggregates

Position	Name	Phone No.
Section Director	Roberto Trevino Flores, P.E.	(512) 506-5907
Geologist, Laboratory Lead	Michael Dawidczik, P.G.	(512) 506-5903
Petrography Laboratory	Edward Morgan, P.G.	(512) 506-5910
Nuclear Program Administration	Aida Guzman-Crawford	(512) 506-5805
Soils and Aggregates Proficiency Program	Chris Huetson	(512) 506-5878

### 3.4.5 Rigid Pavements and Concrete Materials Section

Responsibilities of the Rigid Pavements and Concrete Materials Section include:

- testing of:
  - geosynthetics and construction fabrics,
  - epoxy adhesives and patching materials,
  - elastomeric products, and
  - de-icing salt and chemical analysis of water;
- testing of lime;
- overseeing hazardous chemical waste disposal and chemical safety;
- testing concrete, quick setting cements, hydraulic cement and concrete admixtures;
- testing and evaluating rapid setting patching materials;
- evaluating concrete aggregates for potential reactivity with cement alkalis;
- testing reinforcing steel, mechanical couplers, multiple pieces tie bars, and steel cable; and
- maintaining the Department’s test procedures for concrete in the [Tex-400-A Series](#) (not including those referring to aggregates) and test procedures in the [Tex-300-D Series](#), and test procedures in the Tex-600-J Series.

#### Helpful Contacts – Rigid Pavements and Concrete Materials

Position	Name	Phone No.
Section Director	Andy Naranjo, P.E.	(512) 506-5858
Concrete Laboratory Lead	Rachel Cano, P.E.	(512) 506-5953
Instrumentation Laboratory Lead	Clifton Coward	(512) 506-5855
Cement Laboratory Lead	Ashley Yunkun	(512) 506-5823
Steel Laboratory Lead	Rachel Cano, P.E.	(512) 506-5921
Chemical Laboratory Lead	Clifton Coward	(512) 506-5855
MTD Concrete Proficiency Program	Rachel Cano, P.E.	(512) 506-5921

### 3.4.6 Prefabricated Structural Materials Section

Responsibilities of the Prefabricated Structural Materials Section include:

- performing Quality Assurance (QA) oversight of:
  - precast prestressed concrete structural members (girders, bent caps, abutments, piling, and bridge deck panels),
  - precast nonstressed concrete structural members (sound walls, retaining walls, coping, railing, and roadway panels), and
  - structural steel bridge members (primary and secondary);
- performing Quality Monitoring (QM) oversight of:
  - elastomeric bridge bearings,
  - precast concrete drainage structures (box culverts, pipe, junction boxes, manholes, and inlets),
  - precast concrete traffic barrier,
  - metal railing (steel and aluminium), and
  - steel non-bridge members including:
    - roadway illumination poles and luminaire arms (steel and aluminium),
    - high mast illumination poles,
    - high mast ring and support assemblies,
    - overhead sign support structures (monotube and truss type) and sign walkways,
    - traffic signal pole assemblies, and
    - intelligent transportation system (ITS) poles;
- performing finished product inspection and stamping of approved:
  - bridge bearings (high load multi-rotational and specialty bearings), and
  - bridge mounted sign supports, and large roadside sign supports;
- performing and providing oversight of non-destructive testing (ultrasonic, radiographic, magnetic particle, and liquid penetrant);
- maintaining Departmental Material Specifications, test procedures, and other technical documents related to prefabricated structural materials; and
- supporting districts with material documentation and testing requirements.

The Prefabricated Structural Materials Section provides operational, technical, and engineering support from its Austin headquarters office and testing and inspection oversight from the field offices.

#### Helpful Contacts – Prefabricated Structural Materials

Position	Name	Phone No.	Specialty, Notes
Section Director	Jason Tucker, P.E.	(512) 506-5935	
Engineer	Christina Gutierrez, P.E.	(512) 506-5927	Standards and Specifications for Fabrication Inspection
Special Projects Coordinator	Miranda Unruh	(512) 506-5929	Material Documentation Support Including Material Deficiencies
Dallas/Fort Worth Field Office	Shawn Gilbert	(512) 466-4127	Field Area Supervisor
Houston Field Office	Javier Torres-Herrera	(682) 213-1572	Field Area Supervisor
San Antonio Field Office	Anthony Biggs	(512) 550-7769	Field Area Supervisor
Victoria/Eagle Lake Field Office	Justin Schneider	(512) 466-4178	Field Area Supervisor
Waco Field Office	Bradley Hurst	(512) 944-4609	Field Area Supervisor

### 3.4.7 External Technical Services

In the event the Central lab cannot handle services that are defined above due to equipment issues, staff, or proprietary information required by the QAP or Specifications, the lab will use external technical services. Such services will include but are not limited to:

- Calibration or Verification:
  - MTS (Proprietary),
  - INSTRON (Proprietary),
  - PINE (Proprietary or Manufacturer Authorized), and
  - Calibration Solutions (Subcontractor);
  
- Certification programs or entities approved by the Department or meeting the AASHTO/ASTM applicable standards:
  - TXAPA/HMAC,

- ACI, and
  - AI; and
- Commercial Laboratories performing materials testing for acceptance defined in the QAP for Design Build or Design Bid Build. The firms are required to participate in the Department’s QAP laboratory qualification process before performing services.

When utilizing such services, the criteria defined in Section 10, “Subcontracting,” will be adhered to ensure quality of all materials and services used.

### **3.5 Quality Policy Statement**

MTD strives to be a recognized leader in materials technology as it applies to design, construction, and maintenance of highways, roads, and bridges. MTD achieves this goal by providing its customers expert materials testing, research, and engineering services through its commitment to the following quality objectives:

- understanding and responding to customer requirements and expectations;
- establishing and maintaining a laboratory Quality System that meets the requirements of AASHTO R 18; ASTM C1077, C1222, D3666, D3740; and relevant Department standards;
- maintaining technically qualified personnel to perform materials testing, research, and engineering in conformance with State methods;
- maintaining technically advanced laboratory and field equipment;
- establishing and maintaining systems that provide quality, error-free data, and documentation;
- ensuring that personnel at all levels are responsible for implementing quality practices in all aspects of their work and are committed to:
  - identifying problems associated with laboratory quality,
  - initiating, recommending, and providing solutions, and
  - assisting in the implementation of corrective and preventive measures;
- ensuring that laboratory staff has familiarized themselves with the content and requirements of the laboratory *Quality System Manual (QSM)* for strict adherence to the policies and procedures contained therein at all times; and
- never compromising on safety.

This Quality Policy has the commitment and support of the MTD Administration and Laboratory Management.

A copy of this policy statement, signed by the Director of MTD on February 11, 2022, is available in Appendix B and on file with MTD's QA Program manager.

## SECTION 4 - STAFF POSITION DESCRIPTIONS, BIOS, AND TRAINING

### 4.1 Position Descriptions and Biographical Sketches

For specific biographies pertaining to AASHTO re:source or CCRL functions, contact QA Programs at (512) 506-5802.

Business Title	Employee Name
MTD Division Director	Ryan C. Barborak, P.E.
MTD Division Deputy Director	Enad M. Mahmoud, P.E.
Flexible Pavements, Section Director	Travis Patton, P.E.
Rigid Pavements and Concrete Materials Section Director	Andy Naranjo, P.E.
Prefabricated Structural Materials Section Director	Jason Tucker, P.E.
Soils and Aggregates Section Director	Roberto Trevino Flores
Technical Project Manager	Thomas L. Smith
Coatings and Traffic Section Director	Johnnie Miller, P.E.

### 4.2 Training Methods

#### 4.2.1 Competency Methods and Evaluations

MTD employs several different training methods for varying conditions of staff experience and background including:

- on-the-job apprentice training (one-on-one) for new employees with little or no experience in laboratory or inspection work,
- formal in-house training sessions for certification, or
- training by external organizations.

AASHTO R 18 requires that an individual with prior experience performing a specific test must have the testing competency confirmed. The following information describes MTD's Training Program, Competency Assurance, and Qualification Program.

All individuals must be trained before performing test procedures not previously performed. The laboratory Section Director or designee is responsible for the training.

## Standard Training Procedure

Step	Action
1.	Trainee receives a copy of the test procedure and report form.
2.	Trainee studies the test procedure.
3.	Trainee observes qualified personnel perform the test procedure.
4.	Trainee performs the test procedure under observation of qualified personnel until the trainee has demonstrated the knowledge and ability to perform the test procedure properly.
5.	Proper performance of the test procedure is documented and retained.

The Section Director is responsible for developing a process to maintain training records.

The ability of an individual to perform the various tests properly is evaluated by the:

- Qualification Program,
- Proficiency Sample Programs, and
- Certification.

For the Qualification Program, designated MTD personnel familiar with the procedures will observe the individual performing the tests. Any discrepancies or variations will be noted, and additional training will need to be provided to the individual.

When required by Quality Control/Quality Assurance (QC/QA) Specifications, individuals performing testing are required to be specifically certified specialists through the HMAC. The certification is valid for 3 yr., for the Department and TXAPA certifications, or for 5 yr., for ACI certifications. When certifications are issued for (ASTM D3740) ASTM and AASHTO procedures, the qualification period is valid for 24 mo. At the end of the 24 mo., requalification is necessary.

The Section Director is responsible for developing a process to maintain records for the Certification Program to comply with the qualification periods mentioned above. The files are located and stored digitally in the Construction Contract Management System (CCMS)

MTD maintains filed proficiency sample records on the Agency's SharePoint site or access through the web-based portal to verify participation.

### 4.2.2 Qualification Program

The purpose of the Qualification Program is to develop a formal procedure to qualify laboratory and field office testing personnel and to improve the knowledge and understanding of personnel performing material testing. The Certification Program for ACI,

Hot-Mix Asphalt (HMA), and for Soils and Base is to develop and maintain a pool of well-trained specialists for state and contract forces to design, test, and manage materials.

All personnel will be qualified at least once every 3 yr. on all tests they perform within their Section or field offices. Personnel qualified by ACI or AI will be qualified at least once every 5 yr. on all tests they perform. Personnel performing ASTM and AASHTO methods pertaining to ASTM D3740 must be requalified every 24 mo. Texas Asphalt Pavement Association (TXAPA) and the American Concrete Institute (ACI) may also certify personnel in the areas of hot-mix asphalt, soils or base, and concrete testing, respectively.

#### **4.2.3 Training Program**

Objectives of this program are to:

- Establish a “trainee” developmental program in accordance with AASHTO Accreditation Policy on Certification programs.
- A trainee is defined as a person learning the various material disciplines and performing acceptance testing under the direct supervision of a qualified evaluator as defined by the materials section.
- A technician will be classified as a trainee and qualified according to in house certification procedures for their first qualification period.

#### **4.2.4 Qualification Process**

Section Directors are responsible for:

- ensuring that all technicians and Engineers in their respective Sections and field offices, where applicable, are qualified and trained to perform the various testing activities, and
- designating a qualified evaluator. This may be a professional engineer, geologist, or experienced technician in each respective section to conduct the qualification.

The qualification process is designed to have the qualified evaluator to administer the qualification process. The process includes training to ensure and maintain the highest sense of quality and a successful qualification process overall.

The individual must first pass a written examination, administered by an authorized evaluator. All written tests require a minimum score of 80% and completed within a 1 hr. period except for concrete tests. When a TxDOT issued written test represents a grouping of procedures, passing is defined with a score of at least 70% on any specific procedure and an overall score of at least 80%. An individual failing the written examination may request a

retest. The retest must be scheduled and administered within 30 days of notification of failure. Individuals are allowed to take the written examination a total of 3 attempts in a 60-day period for written tests.

To qualify, an individual must successfully perform the specific test and the necessary calculations required to determine specification compliance in the presence of an authorized evaluator. The definition of a successful performance is demonstrating the ability to properly perform the key elements for each test method. If the individual fails to demonstrate the ability to perform a test, the individual is allowed one retest per test method at the evaluator's convenience. Retesting must occur within 30 days of notification of failure. Failure to pass the second performance examination is equivalent to failing the entire qualification and must retake both the performance observation and written examination.

Failure to obtain a certification on a specific test method will require the individual to obtain additional training. Attempting to requalify cannot occur within 90 days of the failure.

If a Department-approved third-party entity (IA) provides qualification based on the Department's Specific Specifications, the third-party entity will need to be qualified by the Materials and Tests Division laboratory supervisor or its designee.

#### **4.2.5 Documentation**

The assessor designated to perform the qualification will maintain and attach supporting documentation when applicable in the statewide Construction Contract Management System (CCMS).

This record serves to document the results of the qualifications and verifies that an individual is qualified to perform tests, and to document all training they have received regarding testing activities. Training includes formal and on-the-job training and any initial and refresher training required to achieve qualification.

The assessor conducting the qualification will use the applicable Department worksheets. If a test procedure is not covered by AASHTO re:source /CCRL, the section must create a worksheet based on Department Test Methods, ASTM, or AASHTO procedures. Worksheets must include the qualifying individual's name, the date of qualification, and the observer's name. Worksheets used to qualify an individual must be maintained and attached in the statewide Construction Contract Management System (CCMS).

Each written test must include the individual's name, date of test, and the score. An official report or summary of the written tests or copies of certificates received from outside entities

(TXAPA and ACI) must be maintained and in the statewide Construction Contract Management System (CCMS).

In addition, the examinee is required to complete Form 2687, “Examinee’s Certification Acknowledgement,” (available through E-forms) which requires their acknowledgement regarding integrity and their rights and responsibilities when participating in remote or virtual certifications.

#### **4.2.6 American Concrete Institute (ACI)**

The central lab is an authorized Sponsoring Group for ACI’s Program certifications. These certifications are valid for 5 yr. and include the following:

- [Concrete Field Testing Technician - Grade 1, and](#)
- [Concrete Strength Testing Technician.](#)

#### **4.2.7 Asphalt Institute (AI)**

The central lab participates in the Asphalt Institute certifications and are valid nationally for 5 yr. and include the following:

- [National Emulsion Technician Certification \(NETC\),](#) and
- [National Binder Technician Certification \(NBTC\).](#)

#### **4.2.8 Hot-Mix Asphalt or Soils and Aggregates (HMAC)**

This program provides training and certification to evaluate expertise in testing and evaluating materials. The programs certifications are valid for 3 yr. and include the training listed below.

- [HMA Plant Production Specialist \(Level 1-A\)](#)—The training course is 3 days, and recertification is 1 day . Maintaining continuous certification, both for technicians, is dependent upon participation in the mandated Proficiency program administered by MTD and TXAPA.
- [HMA Roadway Specialist \(Level 1-B\)](#)—The training course is 2 days, and the certification course is 1 day. There is no proficiency program for Level 1-B.
- [HMA Mix Design Specialist \(Level 2\)](#)—First-time candidates for Level 2 must take the full 5-day Level 2 training course. Level 1-A is a prerequisite for Level 2.
- [SB Properties Specialist \(SB 101\)](#)—First-time candidates for SB 101 must take the full 3-day training course. Recertification is a 2-day course. To maintain certification, the candidate must participate in the mandated Proficiency program administered by MTD and TXAPA.

- [SB Field Specialist \(SB 102\)](#)—The course is 1 day. There is no proficiency program for SB 102.
- [SB Materials Analyst Specialist \(SB 103\)](#)—The course is 1 day.
- [SB Strength Specialist \(SB 201\)](#)—First-time candidates for SB 201 must take the full 3-day training course. To maintain certification, the candidate must participate in the mandated Proficiency program administered by MTD and TXAPA.
- [SB Specialist \(SB 202\)](#)—First-time candidates for SB 202 must take the full 5-day training course. Level SB 201 is a prerequisite for SB 202. To maintain certification, the candidate must participate in the mandated Proficiency program administered by MTD and TXAPA.
- [AGG101](#)—Certification is a 1 day certification course that certifies an individual’s ability to sample and test aggregates according to Department Test Procedures and Specifications. To maintain certification, the candidate must participate in the mandated Proficiency program administered by MTD and TXAPA.

### **4.3 Responsibility and Program Administration**

The MTD program manager is responsible for the administration of the Department-approved programs. MTD Flexible Pavements Sand Soils and Aggregates Section qualify the [Texas Hot Mix Asphalt Pavement Association \(TXAPA\)](#) evaluators, who then administer the program statewide. ACI defines the operations and requirements for the Department Sponsoring Group through the Certification Committee and Program Operations Manual (CCPOM). The program administrators ensure through periodic program audits and when the CCPOM is revised to ensure current practices meets the requirements of ACI policies and procedures.

### **4.4 Certification Standards**

When Department Specifications require QC or QA testing, certified specialists must obtain qualification from the indicated certification levels indicated by the Specification. Certification can only be obtained through successful completion of the program requirements detailed above.

#### **4.4.1 Hot Mix Certification Steering Committee (HMCSC)**

The HMCSC is co-chaired by a Department representative, appointed by the Department’s MTD Director, and a TXAPA representative, appointed by TXAPA’s Executive Vice President. Four additional Department and 4 additional industry representatives serve as the remaining members. One of the 4, from each Department and industry, must be a Certified Specialist.

The Co-Chairs of the HMCSC are responsible for annual review of the Certification Program and providing suggestions for modifications and improvements to the program curriculum and operations. Co-Chairs also review and resolve accusations concerning decertification, make recommendations to TXAPA to determine when recertification refresher courses are needed, and perform other duties as needed to successfully implement and continue the Certification Program. A HMCSC meeting can be called at any time by the Co-Chairs of the committee or by written request of at least 3 committee members. A majority of the members of the HMCSC must be present for transaction of official business.

#### **4.4.2 Concrete Certification Steering Committee (CCSC)**

The CCSC consists of the ACI Sponsoring Group committee members that include a primary contact, secondary contact, MTD technical director, and Quality Manager. The role of the committee is to review and resolve accusations and perform other duties as needed to successfully implement and continue the Certification Program.

#### **4.4.3 Certification Status**

The HMCSC, TxDOT, and CCSC (ACI-MTD) reserves the right to remove technicians for misconduct. Allegations of misconduct must be in writing to the MTD QA manager, HMCSC, or CCSC and should contain the name, address, and signature of the individual making the allegation. All reported allegations are investigated. The applicable committee will determine the appropriate action and if the allegation appears to be warranted, both the accused and the individual making the allegation, are notified of the opportunity to appear before the committee for resolution of the allegation. Penalties could range from a reprimand to permanently revoking the technician's certification status in the CCMS. The Co-Chairs or designated members will notify all involved parties, in writing, of the findings.

Technicians disagreeing with the findings and results of the investigation may appeal the decision.

- Appeal requests for TxDOT and ACI-MTD issued certifications should be formally directed to the MTD-DD. The appeal process and investigation will be handled by 4 different TxDOT employees selected by the MTD-DD that were not previously involved in reviewing the case. Results of the appeal will be binding and considered final.
- Appeal requests for HMAAC investigations should be formally directed to the HMAAC co-chairs for further handling. The appeal process will consist of a separate appeals committee comprised of industry members (the "Appeal Committee"). The process may be escalated further by arbitration in Hays county and the results will be considered final and binding.

The 3 levels of misconduct are neglect, abuse, and breach of trust. Neglect is the unintentional deviation from testing procedures or Specifications. Abuse is careless or

deliberate deviation from testing procedures or Specifications. Breach of trust is a violation of the trust placed in certified specialists that includes, but is not limited to:

- falsification of records;
- awareness of improprieties in sampling, testing, or production by others and not reporting them to appropriate supervisors involved in the project;
- resampling or retesting without awareness and consent of appropriate supervisors involved in the project; and
- manipulating compensation or production.

#### **4.4.4 Federally Mandated Proficiency Testing Program**

In 1999, the HMCSC initiated and approved a requirement for all Level 1-A specialists to participate annually in the Department's Proficiency Testing Program. **In 2002, the requirement for participation became mandatory** (23 CFR 637, "Quality Assurance Procedures for Construction"). The program has expanded to include compressive strength testing for concrete, SB 101, SB 201, SB 202, **and AGG 101** specialists for soils and base **if performing acceptance testing**. Some of the benefits of mandatory proficiency testing include:

- reducing the variation in testing,
- helping identify equipment and procedural problems, and
- reducing the number of disputes that may arise because of testing variation between two or more laboratories.

Proficiency testing is not a competition; the results are compared to statewide averages, not to known values. All ratings and rankings are indicators of how representative a technician is to the state population based on a standard deviation.

The Department typically distributes the proficiency samples in January. Individuals have approximately 2 mo. to perform the tests and submit their results. **All concrete strength certified individuals, Level 1-A, SB 101, SB 201, SB 202, and AGG 101 specialists performing acceptance testing are required to participate** each year. Certified specialists that do not participate in the Proficiency program will have their certifications inactivated and will not be allowed to perform testing on any Department project. Individuals can resume testing when certification has been reinstated by successfully **completing additional training and recertification**. MTD may grant a temporary suspension on a case-by-case basis under extenuating circumstances. During suspension, the individual will not be allowed to perform testing on any Department project.

## **SECTION 5 - EQUIPMENT**

### **5.1 Equipment Inventory**

Manufacturer instructions, for applicable calibration and verification equipment, are in the Calibration Section or the respective laboratories. Calibration Software CCMS maintains the inventory of major sampling, testing, calibration, and verification equipment. (See Section 5.4 for more detailed information.) Each MTD Section laboratory is responsible for the management of its equipment within the program. For tracking purposes, laboratories can reference equipment by either the unique identification number or the model and serial number. Significant equipment includes equipment that is amortized (e.g., shakers, physical and chemical testing machines, baths, balances, ovens, microscopes) and computer testing equipment. (Chairs, desks, and file cabinets are not included in the category for laboratory equipment.) Major laboratory equipment does not include expendable items such as glassware, sieves, molds, or viscometers but may still require verification.

### **5.2 Equipment Maintenance**

The following applies only to routine equipment maintenance outside the scope of equipment calibration, described in Section 5.4.

Laboratory sampling and testing equipment must be maintained according to the manufacturer's instructions, and each laboratory must have detailed written procedures for how to perform the maintenance. In most cases, the laboratory should refer to the manufacturer's instructions to determine the maintenance interval and procedures; in some instances, however, the laboratory will need to create its own maintenance intervals and procedures. In either case, a systematic procedure for each piece of equipment needing routine maintenance must be on file in the appropriate laboratory.

### **5.3 Equipment Maintenance Logs (EML)**

Laboratories will be required to use the EML for creating an individual log for each piece of equipment requiring routine maintenance. An EML template is available on the [Quality System webpage](#). At a minimum, the EML will include:

- name of equipment, section, room number, and maintenance frequency;
- description of required maintenance, due date, and actual maintenance date; and
- initials of persons conducting the maintenance.

The Section Director is responsible for EML's. The Section Directors may assign a designee for reviewing the EMLs to verify that equipment maintenance and documentation is

performed on all required equipment at specified intervals and in accordance with AASHTO/ASTM requirements or the manufacturer's instructions. Equipment maintenance may be performed within a 7 day period before the previous expiration date when using a static date. An example of an EML can be found in Appendix D.

## 5.4 Equipment Calibration, Verification, and Checking

The Calibration Group and the individual laboratories are jointly responsible for the calibration of equipment. The Section Directors or designee is responsible for ensuring that only calibrated equipment is used in the laboratory.

The calibration tracking used is an AASHTO product calibration management system accessible through CCMS. The software tracks the Serial number, manufacturer, description, calibration authority, calibration type, calibration method, calibration date, expiration date, model number, status, lab, and geographic region. The software includes equipment that is new, repaired, or needs calibration before being placed back into service. A query can be performed to track equipment needing calibration using a coding system that flags the calibration status.

The software also uses a script that automatically sends a reminder email to pre-determined entities 15 and 30 days before the calibration expiration date. This function maintains current calibration within the applicable calibration interval.

### 5.4.1 Checking and Ensuring Record Integrity

The Section Director is responsible for the program. The Section Director will assign a Designee for each laboratory. The Designee is responsible for tracking equipment calibrations and reference standards. The person performing the calibration for the equipment is the Calibrator.

Calibration records will be maintained in the CCMS (SiteManager) and MTD share drive as required by the MTD Quality Manual. All calibrations will be in accordance with AASHTO/ASTM, or the Tex-methods procedures and frequencies defined by the lab standards.

The following outlines procedurally how this will be accomplished:

- Section Director will ensure staff is adequately trained and qualified to perform calibrations;

- the Calibrator will reference the test procedure and any documents needed to perform the calibration. The Calibrator will use the calibration Excel form and ensure all fields are populated (N/A may be used as needed) except for the reviewed by fields;
- before the expiration date, the Calibrator will submit each completed calibration form to the Designee to review and complete the reviewed by fields. The Designee reviewing calibration forms should make sure that the latest version of the test procedure is used, review the calibration Excel sheet form for accuracy, clarity, completeness, and check for any errors. If errors are found, they should be logged (Form 49-1001, "Equipment Error Log and Audits"). The Designee will notify the Calibrator of the issues and work to get these corrected to prevent recurrence and ensure errors were fully resolved and then complete the reviewed by fields to approve the calibration record.
- the Calibrator or Designee will ensure the calibration date is updated in the CCMS (SiteManager);
- within one-week after completion of the equipment standardization or verification record, the Designee will generate a PDF file of the approved calibration record. The file may be uploaded to the share drive by the Designee, Calibrator, or a Record Keeper;
- Section Director or Designee will also be a point of contact for equipment calibrated by a third party to ensure the requirements are met for the applicable standard; and
- Section Director will review the error log and perform an audit of calibration records. The audit should be conducted annually, and inconsistencies should be reported (Form 49-1001) and sent to the Quality Assurance group.

Equipment that has been found to be out of tolerance will be taken out of service and communicated to all personnel to validate any testing that may have previously been performed on the equipment. If any test reports issued that could have been influenced by the failed calibration, an investigation will be launched to determine the extent of the influence on any test results for acceptance. (See Section 6, *Test Records and Reporting*.)

Equipment that is out of calibration must be labeled with a sticker reading "Do Not Use – Out of Calibration" and equipment that is out of service labeled "Out of Service"; the status of all equipment is updated accordingly. If the piece of equipment going for surplus is tagged with a Minor Equipment System (MES) inventory sticker, it must first be removed from the Department's inventory by completing and submitting a request for surplus to GSD; contact your Purchaser for more information.

## 5.5 Calibration Reference Standards and Traceability

The Department's [Tex-900-K Series](#) test procedures cover the methods for calibrating, verifying, and certifying various devices and equipment used in testing materials. As described above, the software automatically maintains an electronic record for each piece of equipment requiring calibration. Equipment calibrations are either conducted in-house or through a consultant contracted by the central laboratory to perform equipment calibration services. The Calibration Laboratory maintains a current listing of the in-house calibrations and the contracted entities that perform the various calibrations. All the calibrations performed for the Department—in-house or consultant-contracted—are traceable to the National Institute of Standards and Technology (NIST).

The Calibration Reference Standards, *Certificates of Traceability*, are stored in and are the responsibility of the MTD Calibration Laboratory. The reference standard documents verify established traceability back to the National Institute of Standards and Technology (NIST) to ensure validity.

The Calibration Group maintains worksheets on in-house reference standards and Certificates of Calibration (traceability records). Calibration intervals will vary depending on the equipment. Worksheet calibration data (pass or fail) is entered into the software, which automatically maintains an electronic record for each piece of equipment requiring calibration.

## 5.6 Equipment Calibration and Verification Tables

Procedures for equipment calibration vary. The intent is to ensure equipment intervals are met and do not exceed the defined interval in Appendix C.

Procedurally, the expiration date may either be based on the equipment interval and the former date calibrated or may remain static in CCMS (SiteManager) to prevent drift and scheduling conflicts.

A static expiration date refers to a piece of equipment that will expire on the same fixed date each year. The equipment may be verified or standardized within a two-week period *prior* to the static expiration date.

The equipment sticker and the calibration record should reflect the same date the equipment was verified or standardized and the expiration date.

Equipment requiring calibration or verification, intervals of calibration, procedures used, and record locations are described in Appendix C. Standard procedures are referenced in AASHTO/ASTM test methods, both of which are available by clicking the appropriate link under “Quick Links” on [MTD’s intranet page](#). [TxDOT Test Procedures](#), digital templates (SharePoint), and [In-House Calibration Procedures \(IHCP\)](#) for equipment calibration or verification, are also available on the Department’s MTD’s intranet site.

## **SECTION 6 - TEST RECORDS AND REPORTING**

### **6.1 CCMS (SiteManager) and LIMS**

The following describes methods MTD uses to prepare, check, produce, and amend test reports.

SiteManager is an AASHTO product and was a joint development project sponsored by twenty transportation agencies. SiteManager's functional areas are Contract Administration, Daily Work Reports and Diaries, Pipeline, Progress and Final Estimates, Civil Rights Compliance, and Materials Management.

SiteManager Materials Management is divided into 6 areas.

- Material Information—materials testing requirements.
- Contract Materials—Contract sampling requirements.
- Approved List—personnel test certifications, qualified laboratories, producers, and producers' approved materials.
- Sampling and Testing—used to satisfy Contract sampling and testing requirements and houses Contract mix designs and quality monitoring (QM) sample IDs.
- Mix Design (not used by the Department).
- XiteManager (the Department only)—an in-house plug-in used to produce reports to aid in maintaining Contract sampling and testing.

SiteManager is a comprehensive automated construction management system that includes certain integrated functions, including the Laboratory Information Management System (LIMS).

#### **6.1.1 LIMS**

LIMS streamlines the materials testing laboratory operations by organizing workloads, improving efficiency of technical and management data access, and improving records accessibility. Test records and reports maintained in LIMS help to track and monitor the sampling and testing data. Test data is entered into a database, failed tests are flagged, and data trends are analyzed.

The laboratory technician performing the test is responsible for recording the original test data onto a worksheet specific to that test and reviewing the test results. The laboratory technician performing the test, or the supervising laboratory technician (or designee) is

responsible for entering test data into the LIMS system. The LIMS system automatically performs any required calculations.

Test data stored in the LIMS system can be used for a variety of reporting purposes. A final test report is generated from LIMS and distributed via e-mail to pertinent District management **and associated with SiteManager**. (See Section 7, *Sample Management and Sample Tracking*.)

### **6.1.2 Amending Reports**

In the event an equipment calibration failure or a technician is observed performing a test incorrectly, an investigation is conducted to determine the extent of the equipment failure and any effects of testing on reports that were issued. The investigation will determine any trends that would indicate a problem in the test data due to incorrectly performing the test or resulting from equipment calibration failure. The findings of the report will be discussed with the Director of MTD and the Quality Assurance Programs Manager on the equipment failure or procedural error and its effects on issued reports. The Quality System management will then notify the recipients of any such reports that may be null and void and document the findings with the intent to provide collaboration for possible solutions such as retesting or outsourcing, depending on availability of materials and timing.

## **6.2 AASHTO re:source and CCRL Proficiency Sample Programs (PSPs)**

The AASHTO resource and CCRL Proficiency Sample Programs were developed as a measure for laboratories to monitor the quality and performance of testing in between on-site assessments. All participating laboratories receive “homogenous samples” (the same material from the same batch)—essential for an accurate comparison of laboratory performance. Samples are distributed once a year for HMA, Emulsified Asphalt, Blended Cement, and steel samples, and twice a year for Soil, Asphalt Cement, Aggregates, Hydraulic Cement, Pozzolans, and Concrete. Each shipment contains 2 slightly different material samples, referred to as a “pair”; instructions and reporting forms are included.

Participation in the PSP includes performing all applicable AASHTO or ASTM test methods on all samples distributed and returning the test result data back to AASHTO re:source / CCRL. AASHTO re:source and CCRL apply statistical analysis methods to compare the test result data and issue a final report to all participating laboratories showing the standard deviations and average values for each determination; laboratory names are kept confidential. CCRL offers a preliminary report in addition to the final report, but the data can vary.

The results of the statistical analysis help the laboratories determine their level of performance and the amount of deviation when compared to other participating

laboratories. If significant deviation exists, the laboratory can troubleshoot to identify and correct any problems.

MTD's central laboratory participates in the PSPs for the following materials.

- [AASHTO re:source](#)
  - Viscosity Grade (VG) asphalt cement
  - Blended asphalt cement
  - Performance Grade (PG) asphalt binder
  - Emulsified asphalt
  - Hot-mix asphalt (HMA) solvent extraction
  - HMA ignition oven
  - HMA gyratory
  - HMA Hveem design
  - Soil classification/compaction
  - Fine and coarse aggregates
  - Paint (voluntary participation is not currently accredited)
  
- [CCRL](#)
  - Hydraulic cement
  - Blended cement
  - Pozzolan
  - Steel Reinforcing bars (rebar)
  - Concrete
  - Alkali Silica Reactivity

### **6.3 AASHTO re:source and CCRL PSP Testing Data and Test Reporting Procedure**

The following establishes the reporting process for test data obtained from AASHTO re:source and CCRL proficiency sample testing. MTD laboratory Section Directors have further defined in their respective SOP the details pertaining to their section and their specific programs. Reference Section 8 for further details on corrective actions.

#### **AASHTO re:source and CCRL PSP Testing Data and Test Reporting Procedure**

Step	Responsible Party	Action
1	Quality System Manager	Receives from AASHTO re:source and CCRL proficiency testing correspondence and testing worksheets.
2	Quality System Manager	Forwards correspondence and worksheets to the responsible personnel in the pertinent laboratory in electronic format, depending on how they are received.
3	Quality System Manager	Highlights and tracks the closing date for all testing to be completed and reported.
4	Section Director or Designee	Reports all test results to AASHTO re:source/CCRL via the respective online reporting website.
5	Quality System Manager	When applicable a report is sent to the section containing a confirmation report of all results submitted.
6	Quality System Manager	Retains a copy of the confirmation report in the laboratory's proficiency testing files.
7	Quality System Manager	Sends the reporting laboratory an email containing the final report. Based on the information contained in the final report: <ul style="list-style-type: none"> <li>• For ratings 3 and above, no further action is needed. (Proceed to Step 11.)</li> <li>• For ratings 2 and below, proceed to Steps 8-11.</li> </ul>
8	Section Director or Designee	Investigates the root cause of the problem, takes corrective actions, and reports the corrective actions using the Proficiency Sample Corrective Action Report Form. (Also see Section 8.1.2, "Procedure to Follow when Poor Results Occur.")
9	Section Director or Designee	Sends the completed Corrective Action Report within the deadline defined to the AAP Manager.
10	Quality System Manager	Reviews the reporting laboratory's Corrective Action Response with the Division Deputy Director to verify that the corrective actions provided appropriately address the problem. Further corrective actions may be required, as determined necessary by the AAP Manager.
11	Quality System Manager	Maintains a copy for the file for future review during the Annual Quality System Review and for AASHTO re:source/CCRL on-site assessments.

## SECTION 7 - SAMPLE MANAGEMENT AND SAMPLE TRACKING

Test sample procedures relating to identification, storage, retention, and disposal are described below.

### 7.1 Incoming Samples

Project samples destined for the MTD central laboratory are either witnessed by Department representatives and sent (from the plant to the Department's Central Laboratory via UPS, bus line, freight, etc.), or collected by Department personnel and sent from the District to the Central Laboratory. All samples are received at the MTD warehouse dock area.

### 7.2 Form 202

Each sample received from the Districts needs a corresponding Form 202, "Identification of Material Samples." Form 202 can be received by the Central Laboratory as follows.

- Paper copy generated from SiteManager included with sample—Copies of Form 202 that are printed directly from SiteManager automatically include an identification bar code across the top portion of the form and the name of the person originating the form.
- The form can then be attached to the sample and mailed, or the electronic copy can be generated from SiteManager and emailed to the appropriate central laboratory (sample arrives separately). The data on electronic emailed versions of Form 202 can open directly into the LIMS system when using the bar code system.

### 7.3 Laboratory Designations

Each central laboratory section has a designated identification letter, as shown below. The laboratory letter is used in LIMS and on a variety of documents.

A = Concrete

D = Cement

I = Structural\*

B = Traffic Materials

E = Soils and Aggregates

J = Chemical Laboratory

C = Asphalt

F = Flexible Pavements

\* Although there are material testing laboratories located in several fabrication plants, the MTD Prefabricated Structural Materials Section's only performs oversight for research and testing of component materials used in those fabrication plants. The Section is also responsible for oversight of in-plant inspection of most prefabricated structural items used in highway and bridge construction.

## **7.4 Tracking Number, Tracking Stickers, and Tracking Log**

Samples received at the warehouse dock will have a carrier or in-house tracking number assigned. Warehouse personnel will deliver samples to the laboratories, or appropriate laboratory personnel may pick them up from the warehouse, in which case the laboratory employee receiving the sample removes the carrier's shipping label, initials the label, and notes the laboratory to which the sample was taken, and leaves the label for the warehouse personnel to verify invoicing, delivery, and tracking. Samples can be tracked via LIMS at any stage of the sample testing phases until testing is complete. A report can also be run in LIMS to track voided items.

## **7.5 Storage**

Incoming samples are either delivered by warehouse personnel to the laboratories or are picked up at the warehouse by laboratory personnel. Regardless of delivery method, samples are stored in a manner that will not contaminate the sample, and proper identification is maintained.

## **7.6 Entering Data into LIMS**

Each laboratory is responsible for logging its respective samples into the LIMS system. For some laboratories, the person receiving and assigning the tracking number is also responsible for logging the sample information into LIMS; however, some laboratories have different personnel assigned to the tasks of receiving, tracking, and data entry. The data entered into the LIMS system includes the category for the type of material (e.g., CementQM, FlyAshQM, Admixture) and pertinent identification information derived from Form 202, including:

- identification of the report and the date issued;
- description, identification, and condition of the test sample;
- identification of the standard test method used;
- test results and other pertinent data required by the standard test method;
- identification of any test results obtained from tests performed by Subcontractors;
- name of the persons accepting technical responsibility for the test report;
- name and address of the testing laboratory;
- identification of the project;
- date of receipt of the test sample;
- dates of test performance; and
- test method deviations, additions, or exclusions.

## **7.7 Sampling**

Handling and conditioning of samples in preparation for testing are in accordance with applicable ASTM or AASHTO methods and various Department [test procedures](#).

## **7.8 Day-to-Day Testing Operations**

Section Director or Designee will assign materials testing to laboratory personnel through LIMS Schedule Manager. Schedule Manager display tasks linked to each sample and pending tasks for personnel use.

LIMS Schedule Manager assists the lead technician or designee to prioritize tasks and to maintain workload distribution among laboratory personnel. It includes the capability to look ahead at scheduled sampling tasks 2 weeks in advance. Technicians receive sample assignments through the LIMS system and can determine their assigned samples by looking at the LIMS Schedule Manager. Technicians are responsible for completing assigned tasks.

## **7.9 Final Test Results**

The Section Director or Designee reviews and initials the final test result worksheet. The laboratory technician enters test data into LIMS, which automatically categorizes the results as a “Pass,” “Fail,” or “Other,” based on Specification limits. The laboratory technician then generates and provides the test report to the Section Director or Designee for review and distribution.

A licensed professional engineer or professional geologist must provide oversight by reviewing failing reports for accuracy.

All calculations for QM samples (including averages) are performed in LIMS. (Calculations for research testing may need to be performed outside of LIMS.) LIMS automatically reviews the data entered into the system for Specification compliance and generates electronic reports. If a hard copy of Form 202 was included with the sample, it may be attached to a printed copy of the final report. Copies of Form 202 provided electronically do not need to be printed unless desired, i.e., electronic Form 202s are linked to the sample data via LIMS.

## **7.10 Retention and Suitable Storage**

After the sample testing is complete, any remaining sample material is retained only until testing results show whether the material passed all requirements.

If the sample fails to comply with Specifications, the sample will be retained in suitable storage.

Suitable storage must maintain original sample condition to maximize the integrity of the sample until any questions regarding test results and disposition of the material are resolved.

Records retention in all laboratories is in accordance with applicable AASHTO re:source or CCRL and Department requirements.

### **7.11 Sample Disposal**

Samples are disposed of in conformance with local solid waste regulations.

### **7.12 Post-Testing Sample Data Reports in LIMS**

When sample testing is complete, the laboratory can select options in LIMS to archive the data, print the data, and send an email report to Districts as needed.

## SECTION 8 - DIAGNOSTIC AND CORRECTIVE ACTION

### 8.1 Diagnostic and Corrective Action for the Proficiency Sample Testing

#### Participation

- AASHTO re:source Asphalt Proficiency Sample Program
- AASHTO re:source Hot-Mix Asphalt Proficiency Sample Program
- AASHTO re:source Soils Proficiency Sample Program
- AASHTO re:source Aggregate Proficiency Sample Program
- AASHTO re:source Paint Proficiency Sample Program
- CCRL Concrete Proficiency Sample Program
- CCRL Cement Proficiency Sample Program
- CCRL Pozzolan Proficiency Sample Program
- CCRL Steel Reinforcing Bars Proficiency Sample Program
- CCRL Alkali Silica Reactivity Sample Program

#### Identifying Poor Results

Any result that is two standard deviations beyond the average value is considered “poor.”

#### Procedure to Follow when Poor Results Occur

Step	Action
1	Determine if the agency, conducting the program, correctly entered the data reported.
2	Determine if the test result obtained was properly transferred to the data sheet submitted.
3	Determine if all calculations leading to the test results obtained were correct.
4	Determine if the equipment used, to perform the test, meets Specification requirements.
5	Determine if the procedures, followed when performing the test, conformed to the Specification requirements.
6	Take corrective action to repair or take steps to replace defective equipment or instruct the technician of the correct procedure to follow.
7	Prepare a letter of record summarizing the results of the investigation, identifying the cause of the poor results, if determined, and describing any corrective action taken.
8	Responses must be submitted within 60 days of the reporting date.

## 8.2 Diagnostic and Corrective Action for On-Site Inspections

### Participation

- AASHTO re:source Asphalt Inspection
- AASHTO re:source Hot-Mix Asphalt Inspection
- AASHTO re:source Soils Inspection
- AASHTO re:source Aggregate Inspection
- AASHTO re:source Metals Inspection
- CCRL Hydraulic Cement Concrete Inspection
- CCRL Cement Inspection
- CCRL Pozzolan Inspection
- CCRL Steel Reinforcing Bars Inspection

### Procedures to Follow when Deficiencies Are Reported

#### Apparatus Deficiencies

Step	Action
1	Determine if the equipment meets Specification requirements.
2	If the equipment is found to be defective, take necessary steps to repair or replace it.
3	Prepare a letter of record summarizing the results of the investigation and any corrective action taken.
4	Submit response within 60 days of inspection results reported.

#### Procedural Deficiencies

Step	Action
1	Discuss each procedural deficiency with the testing technician and review the proper procedure.
2	Observe the technician perform the test properly.
3	Prepare a letter of record summarizing the action taken.
4	Submit response within 60 days of inspection results reported.

### Quality System Deficiencies

Step	Action
1	The Quality Assurance Program Manager must review each deficiency cited by the evaluator with the responsible employee.
2	Take appropriate action.
3	Prepare a letter of record summarizing the action taken.
4	Submit response within 60 days of inspection results reported.

## 8.3 Diagnostic and Corrective Action for Quality System Reviews

### Participation

- Asphalt
- Soils and Aggregates
- Flexible Pavements
- Rigid Pavements and Concrete Materials (RPCM)
- Coatings and Traffic Materials (CTM)

### Procedures to Follow when Observations or Deficiencies Are Reported

#### Quality System Deficiencies

Step	Action
1	The Quality Assurance Program Manager must communicate and distribute a report summarizing the findings from the review.
2	The Section Director or designee will address each deficiency formally and report it on the CAR provided.
3	Documentation should be attached to support the corrective actions.
4	Submit completed CAR within 21 days of inspection results reported.

**Note 1**—For additional information on the Quality System Review see Section 9, “Annual Quality System Reviews.”

## 8.4 Handling Technical Complaints

MTD's AASHTO accreditation requires a written procedure for handling technical complaints. The following describes the procedures for handling technical complaints related to materials testing within MTD's laboratory functions. This procedure meets the requirements of AASHTO R 18 and the Department's customer contact coordination and complaint resolution process.

A technical complaint is a verbal, written, or email complaint statement concerning the technical nature of materials testing. The following actions must be taken upon receipt of a technical complaint concerning materials testing.

### Handling Technical Complaints

Step	Action
1	The employees involved, and the laboratory supervisor or designee will immediately review the complaint and determine whether the customer feedback is a complaint based on the guidelines and definitions outlined in the Department's customer contact coordination and complaint resolution process.
2	The laboratory supervisor or designee will determine if any unusual problems or circumstances were involved and review all pertinent test reports, records, and data to include a check of the calculations to verify accuracy.
3	The laboratory supervisor or designee will promptly report the findings to the Section Director within 2 – 7 working days. The Section Director will make the final determination on the appropriate response.
4	The laboratory supervisor or designee will update the Department's complaint resolution system as soon as possible, and no later than 7 working days from the initial contact, with pertinent data or information.
5	The Section Director or the laboratory supervisor or designee will promptly contact the customer as soon as possible, and no later than 3 days from the initial contact, to provide information to resolve the complaint or verify all aspects of the complaint and; if possible, provide a resolution timeline.

## **SECTION 9 - ANNUAL QUALITY SYSTEM REVIEWS**

### **9.1 Internal Quality System Review**

MTD's central laboratory accreditation requires an annual internal review of the quality system to verify compliance with accreditation requirements. MTD QA Program personnel conduct the review by auditing certain records and documents pertaining to the central laboratory's operations for the Asphalt, Flexible Pavements, Concrete, Cement, Soils and Aggregates, Chemical, and Coatings/Traffic Materials laboratories. The review process involves checking laboratory records, reports, and documentation in the following areas:

- proficiency sample and on-site inspection reports,
- equipment calibration and verification and inspection records/reports,
- technician qualification and training records, and
- Quality System Program documentation.

MTD Internal Reviews use a formal Internal Quality System Review Checklist to document and issue a report on the findings. Deficiencies noted are discussed with appropriate staff to ensure that corrective action is taken—immediately, during the reporting process, or after the final report is completed. MTD's QA Program personnel sends a final report to the MTD Deputy Director with distribution to applicable section personnel. In addition, upon completion of the laboratory quality system review will be discussed during the management review meeting. See Section 8.3, "Diagnostic and Corrective Action for Quality System Reviews," for detailed information on Diagnostic and Corrective Action requirements.

### **9.2 AASHTO Accreditation Review**

In August or September of each year, AAP sends MTD an annual request to update contact information and staffing, and to verify tests for maintaining or adding to the scope of accreditation. MTD's QA Program Manager provides a written response, which includes completing the application and providing copies of changes made to the QSM during the year. See [Section 8.2](#) for detailed information on Diagnostic and Corrective Action requirements.

### **9.3 Management Review Meeting**

In April or May of each year, MTD's QA Programs Manager will review the laboratory Quality System testing and calibration activities to ensure their continuing suitability and effectiveness. The MTD Director will chair Management Review meetings, to include the following attendees: Technical Operations Engineer, Quality System Management, Section Directors, Laboratory Engineers or Supervisors, and other key technical personnel as

appropriate. An agenda is set to discuss all Quality System items pertaining to the laboratories. This includes AASHTO re:source /CCRL inspections, review of audits, proficiency sample performance, corrective action, and pending changes. Minutes are recorded to include action items that will require follow up and are distributed to all in attendance.

## **SECTION 10 - SUBCONTRACTING**

Only a small portion of the materials testing, and equipment calibration is conducted using external consultants or vendors.

### **10.1 Subcontractor Quality Assurance**

Any provider contracted by the central laboratory to perform materials testing is evaluated in accordance with the Department's Quality Assurance Program. This program includes detailed requirements in the following areas.

- Technician Qualification—Consultant technicians are required to be qualified to perform testing described in the scope of the testing contract. All testing is performed in accordance with the appropriate Department, ASTM, or AASHTO test procedures. Technicians are qualified by written examination and observation and are further evaluated by annual split or proficiency samples. Documented evidence of certification by an appropriate non-Department entity may be substituted.
- Laboratory Qualification—Consultants are evaluated to ensure that their laboratory facilities and equipment are adequate for the performance of required sampling and testing procedures. Laboratories are reviewed to ensure proper maintenance of equipment calibration in conformance with prevailing standards. Also reviewed are results of external inspections and any certifications and accreditations held by the laboratory.
- Asphalt Binder Quality Plans- Consultants are required to submit a quality plan in accordance with [Tex-545-C](#). The MTD Asphalt branch manager or section director will:
  - Review for compliance.
  - Request revisions to supplier; and
  - Provide final acceptance and approval of the plan.

### **10.2 Equipment Calibration Services**

Any consultant contracted by the central laboratory to perform equipment calibration services is evaluated according to the following criteria.

- Calibration procedures used must follow appropriate ASTM and Department procedures, and calibration standards must be traceable to the National Institute of Standards & Technology (NIST).
- Measurement standards must be certified to meet the respective ASTM standards.
- Evidence of training and certification of personnel must be maintained.
- Certifications and accreditations held by the laboratory must be reviewed.

- Equipment records must be maintained, to include equipment description; manufacturer name, model, and serial number; dates, results, and copies of reports of all calibrations; due date of next calibration; and manufacturer instructions.
- Calibration certificates issued must contain the measurement results, including the measurement of uncertainty or a statement of compliance with an identified metrological Specification; calibration procedures used, date of calibration, next due date; and the name, function, and signature of persons accepting technical responsibility for the work.

Calibration laboratories fulfilling the above requirements are considered competent. The above outlines the technical criteria for assuring the quality of these specific external services. Section 6 of this manual describes the procedures for reporting test results. The [PEPS Contracting Manual](#) and the [Negotiated Contracts Procedures Manual](#) describe general conditions and other administrative guidelines pertaining to the selection and contracting of consultants.

### **10.3 Vendor Services**

Any vendors used by the Central Laboratory providing materials or services are evaluated according to the following criteria.

- Bidding process- Vendors used by the state are awarded the ability to perform such services through a competitive bidding process.
- Insurance- The Construction Division and Procurement Division handle all legality and state statues and requirements through the Comptroller’s Office.
- Accreditation- The vendor is required to show and participate (when applicable) in the accreditation process related to their field of expertise. They may include but are not limited to the following areas:
  - Dimensional;
  - Electromagnetics – DC/Low Frequency;
  - Time and Frequency;
  - Mechanical;
  - Thermodynamic;
  - acceptable accreditation bodies for vendors and subcontractors are the following acknowledged programs that meet ISO/IEC 17025 Accreditation:
    - A2LA-American Association for Laboratory Accreditation, and

- NVLA-P National Voluntary Laboratory Accreditation Program;  
and
  - \* in the event an accreditation body is not mentioned above, Department management will evaluate the criteria to determine on a case-by-case basis if it is deemed acceptable for the applicable scope.
- 
- Evaluations or Vendor Performance Report (VPR)- The business management office handles the requirement by the Procurement Division for the VPF (Form 2224). It is to be completed to evaluate and document the level of service, value, performance, and any resolution if necessary. Documentation will reflect a positive or negative evaluation and an overall rating before any renewals will be granted.

## **SECTION 11 - SAFETY**

Requirements pertaining to a safe and healthy workplace are vital to maintaining an environment that is conducive to quality materials testing.

All Department, including MTD, is committed to maintaining a safe work environment and never compromising safety. Safety information can be found on the [TxDOT Safety page](#) and the [Occupational Safety Intranet site](#).

The Occupational Safety Division (OCC) is responsible for instituting a Department-wide written hazard communication program found in the [Occupational Safety Manual](#).

Each Department District is required to develop and maintain a comprehensive written hazard communication program that is relative and specific to each District and its field operations. The [Materials and Tests Division Safety Program](#) information can be found on the Division's SharePoint site.

All MTD Section Directors are responsible for ensuring mandatory monthly safety meetings and monthly safety assessments of the laboratory and office work areas. Safety assessment checklists include required safety items such as fire extinguisher and first-aid kit inspections. Safety guidelines can be found in the Occupational Safety Manual, Ch. 5, "Safety."

All MTD employees are responsible for maintaining a safe work environment, observing safety policies and procedures, and reporting potential safety problems to supervisor or MTD safety officer.

MTD's Central Laboratory includes facility-specific procedures for Bldg. 51 emergency situations [that is available through the MTD site](#).

MTD's Central Laboratory includes facility-specific procedures for Bldg. 51 hazardous materials [that is available through the MTD site](#). It includes detailed information concerning the importance of good housekeeping practices.

## SECTION 12 - RECORDS RETENTION

A policy detailed in the Records Retention Schedule meets AASHTO R18, ASTM C1077, C1222, D3666 and D3740 defining the retention and storage of records. All electronic records are stored on the HQ29 server, the SiteManager database or the Laboratory Information Management System (LIMS). Disposal or deleting of *any* electronic records requires form 1420 to be completed and approved by upper management before their destruction and to ensure the record retention policy has been met. The following table defines and meets the above quality system requirements. The greater interval has been defined and is the intended record requirement.

<b>Record Type</b>	<b>Interval Requirement (years)</b>
External assessments	5
Internal audits	5
Management reviews	5
Proficiency sample testing	5
Technician training, evaluations, and certifications	10
Personnel	10
Test data and reports	5
Customer complaints	5
Corrective actions	5
Maintenance	10*
Equipment calibrations,	10*

standardizations,  
checks

\*This type of record may be held throughout the life of the equipment.

## Appendix A Acronyms and Definitions

The following terms and definitions are referenced in this document and have the meanings set forth below.

AAP	AASHTO Accreditation Program (AASHTO re:source and CCRL)
AASHTO	American Association of State Highway Transportation Officials
AMPP	Association for Materials Protection and Performance
ABQP	Asphalt Binder Quality Program
ACI	American Concrete Institute
ASTM	American Society for Testing and Materials
CCMS	Construction Contract Management System
CCPOM	Certification Committee and Program Operations Manual
CCRL	Cement and Concrete Reference Laboratory
CCSC	Concrete Certification Steering Committee
EML	Equipment Maintenance Logs
SA	Soils and Aggregates
HMA	Hot-Mix Asphalt
HMAC	Hot-Mix Asphalt Center

HMCS	Hot-Mix Certification Steering Committee
IA	Independent Assurance
IHCP	In-House Calibration Procedures
LAP	Laboratory Assessment Program
LIMS	Laboratory Information Management Systems
LRA	Limestone/Rock/Asphalt
MES	Minor Equipment System
MPL	Material Producer List
MTD	Material and Tests Division
MTRAC	Multi-Regional Training and Certification
NIST	National Institute of Standards and Technology
OCC	Occupational Safety Division
PSP	Proficiency Sample Program
QAP	Quality Assurance Program
QAT	Quality Assurance Testing
QC/QA	Quality Control/Quality Assurance
QM	Quality Monitoring
QSM	Quality System Manual
QSP	Quality System Program

SCOM	Subcommittee on Materials
SME	Subject Matter Expert
TC3	Transportation Curriculum Coordination Council
TXAPA	Texas Asphalt Pavement Association
VPF	Vendor Performance Report
WASHTO	Western Association of State Highway and Transportation Officials

**Abuse**—Careless or deliberate deviation from testing procedures or Specifications.

**Breach of Trust**—Violation of the trust placed in the certified technician including, but not limited to, acts such as: falsification of records; being aware of improprieties in sampling, testing, or production by others and not reporting them to appropriate supervisors involved in the project; re-sampling or retesting without awareness and consent of appropriate supervisors involved in the project; and manipulating compensation or production.

**Certified Technician**—A technician certified by some agency as proficient in performing certain duties.

**Independent Assurance (IA) Program**—Activities that are an unbiased and independent evaluation of all the sampling and testing procedures, equipment and personnel qualifications used in the Acceptance Program.

**Neglect**—Unintentional deviations from testing procedures or Specifications.

**Proficiency Samples**—Homogenous samples that are distributed and tested by 2 or more laboratories or personnel. The test results are compared to assure that the laboratories and personnel are obtaining the same results.

**Qualified Laboratories**—Laboratories that are capable as defined by appropriate programs established by the Department. As a minimum, the qualification program must include provisions for checking testing equipment, and the laboratory must keep records of calibration checks.

**Quality Assurance (QA)**—All planned and systematic actions necessary to provide confidence that a product or service will satisfy given requirements for quality.

**Quality Control (QC)**—All Contractor operational techniques and activities performed or conducted to fulfill the Contract requirements.

**Department Standard Specifications**—the *Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges* adopted by the Department, including all revisions thereto applicable on the effective date of the Contract Documents.

## Appendix B Policy Statement



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### *Quality Policy Statement*

Our objective at the Materials and Tests Division (MTD) state central lab is to provide leadership and guidance to serve the needs of the Public and the State of Texas.

We strive to provide quality expertise in the areas of:

- materials, testing, and inspection;
- specification development and support;
- procedure and methods for acceptance;
- laboratory accreditation;
- training and certification;
- oversight and compliance to all FHWA regulations, ASTM/AASHTO laboratory standards, and accreditation bodies; and
- engineering services.

The pursuit of excellence, integrity, and continual improvement has a direct correlation to **Safety and Quality**. We achieve this objective through effective communication, the support of our staff, auditing our programs, reviewing our quality objectives annually, and ensuring the suitability of the Quality Management System overall.

2/11/2022

DocuSigned by:  
*Ryan C. Barbarak, P.E.*  
F5262911199748E  
Division Director-MTD

**Appendix C**  
**Equipment Calibration and Verification Tables**

**General Testing Equipment**

<b>Equipment</b>	<b>Test Method (AASHTO/ASTM)</b>	<b>Department Test Method Used for Calibration (In-House Calibration or Equivalent)</b>	<b>Calibration Requirement</b>	<b>Max Interval (months)</b>
Mechanical Shakers	T 27, C 136	Hot-Mix Asphalt (HMA) In-House Calibration Procedure (IHCP) #3	Check sieving thoroughness	12
Ovens (For Ignition Ovens, see HMA Testing Equipment. For Thin-Film Ovens, see Asphalt and Soils Testing Equipment.)	E 145	Tex-927-K	Standardize thermometric device	12
Coarse Sieves <sup>1</sup> (Openings $\geq 4.75$ mm)	M 92, E 11	Tex-907-K	Check physical condition (visual inspection) For #4 sieves and greater, also verify dimensions of openings (Tex-198-E and Tex-498-A)	12
Fine Sieves <sup>1</sup> (Openings $< 4.75$ mm)	M 92, E 11	Tex-907-K	Check physical condition (visual inspection)	12
General Purpose and Analytical Balances, Scales, and Masses <sup>1</sup>	M 231, E 898	Tex-900-K, Tex-901-K	Standardize	12
Thermometers, Mercury <sup>1</sup>	E 77	Tex-926-K	Standardize	12
Thermometers, Digital <sup>1</sup>	E 77	Tex-926-K	Standardize	12
Thermometers, Infrared <sup>1</sup>	E 1256	N/A	Standardize	12
Calipers <sup>1</sup>	N/A	N/A	Standardize	12
Vacuum Measurement Devices	N/A	HMA IHCP #1	Standardize	12
Pressure Measurement Devices <sup>1</sup>	T 67-6, D 5720	Tex-227-F	Standardize	12

<b>Equipment</b>	<b>Test Method (AASHTO/ASTM)</b>	<b>Department Test Method Used for Calibration (In-House Calibration or Equivalent)</b>	<b>Calibration Requirement</b>	<b>Max Interval (months)</b>
Length Measurement Devices (Dial Indicators, LDTs, LVDTs, and Extensometers)	N/A	N/A	Standardize	12
Compression, Tensile Testing Devices	E 4, E 74	Tex-902-K	Standardize	12
General Purpose Timing Devices	N/A	N/A	Standardize	12

1. Equipment calibrated by the Department MTD Calibration.

#### **Asphalt Binder / Cutback Asphalt / Emulsified Asphalt Testing Equipment**

<b>Equipment</b>	<b>Test Method (AASHTO/ASTM)</b>	<b>Department Test Method Used for Calibration (In-House Calibration or Equivalent)</b>	<b>Calibration Requirement</b>	<b>Max Interval (months)</b>
Saybolt Viscometers	T 59, T 72, D 244, D 88	Asphalt IHCP #13	Standardize	36
Timing Devices	T 49, T 201, T 202, D 5, D 2170, D 2171	Asphalt IHCP #1	Standardize	12
Penetrometer Needle	T 49/D 5	Asphalt IHCP #6	Check condition and critical dimensions	12
Penetrometer	T 49/D 5	Asphalt IHCP #6	Standardize	12
Ductility Machine	T 51, T 300, T 301, D 113, D 6084	Asphalt IHCP #12	Check speed of travel	12
Thin-Film Oven Shelf and Rolling Thin-Film Oven (RTFO) Carriage	T 179, T 240, D 1754, D 2872	Tex-541-C, Asphalt IHCP #4 and 14	Check rotation speed	12
Brass Rings and Assemblies	T 53/D 36	Asphalt IHCP #11A, 11B, and 11C	Check critical dimensions	12
Pycnometers	T 228/D 70	Asphalt IHCP # 10	Check physical condition, standardize volume	12
Collars and Floats	T 50/D 139	Asphalt IHCP #7	Check critical dimensions	12

<b>Equipment</b>	<b>Test Method (AASHTO/ASTM)</b>	<b>Department Test Method Used for Calibration (In-House Calibration or Equivalent)</b>	<b>Calibration Requirement</b>	<b>Max Interval (months)</b>
Flow Meters (on RTFO)	T 170, T 240, D 1856, D 2872	Tex-541-C	Standardize	12
Flash Cups	T 48, T 79/D92, D 3143	Asphalt IHCP #8, 9	Check critical dimensions	12
Pressure Aging Vessel (PAV)	R 28/D 6521	Asphalt IHCP #18	Standardize temperature and pressure	6
Rotational Viscometer	T 316/D 4402	Asphalt IHCP #20	Standardize with reference fluid	6
Dynamic Shear Rheometer (DSR)	T 315/D 7175	Asphalt IHCP #17	Standardize with reference fluid	6
Bending Beam Rheometer (BBR)	T 313/D 6648	Asphalt IHCP #19	Calibrate masses	12

1. Equipment calibrated by the Department MTD Calibration.

#### **Asphalt Mixtures Testing Equipment (Hot Mix Asphalt)**

<b>Equipment</b>	<b>Test Method (AASHTO/ASTM)</b>	<b>Department Test Method Used for Calibration (In-House Calibration or Equivalent)</b>	<b>Calibration Requirement</b>	<b>Max. Interval (months)</b>
Stabilometer	T 167, D 1074, T 246, D 1560, E 4, E 74	Tex-925-K	N/A	12
Follower, Calibration Cylinder	T 246, T 247, D 1560, D 1561	HMA IHCP #20	Check critical dimensions	12

<b>Equipment</b>	<b>Test Method (AASHTO/ASTM)</b>	<b>Department Test Method Used for Calibration (In-House Calibration or Equivalent)</b>	<b>Calibration Requirement</b>	<b>Max. Interval (months)</b>
Superpave Gyrotory Compactor (SGC)	T 312/D 7115, AASHTO TP 71, PP 48 <sup>1</sup>	Tex-241-F, HMA IHCP #10	Check critical dimensions, standardize ram pressure, ram height displacement, LVDT, angle of gyration, frequency of gyration, verification of mold ID  MTD Central Calibration Laboratory is responsible for checking critical dimensions/ verifications for SGC molds and critical dimensions for the Ram Face and Base Plate Face.	12
Texas Gyrotory Compactor	N/A	Tex-914-K	Standardize	12
Ignition Oven (Furnace) – Internal Balance <sup>1</sup>	T 308/D 6307	Tex-901-K	Standardize	12
Overlay Tester <sup>2</sup>	N/A	In development	N/A	12
Flow Meters (Abson-Recovery)	T 170/D 1856	HMA IHCP #7	N/A	12
Water Baths	N/A	HMA IHCP #5	N/A	12
Length Measurement Devices (Hamburg Wheel-Tracker Device, LVDT)	T 245/D 6927/ T 324	Tex-242-F, HMA IHCP #14	N/A	12

1. Equipment calibrated by the Department MTD Calibration.

2. Overlay tester is not required by AASHTO re:source. The Flexible Pavements Laboratory is currently working toward establishing an in-house calibration procedure for the overlay tester.

### Soil Testing Equipment

Equipment	Test Method (AASHTO/ASTM)	Department Test Method Used for Calibration (In-House Calibration or Equivalent)	Calibration Requirement	Max Interval (months)
Mechanical Compactor, Compaction Hammers, and Molds	D 2168	Tex-113-E, Tex-114-E, Tex-198-E	Standardize	12
Mechanical Compactor, Automatic Tamper	D 21	Tex-198-E	N/A	12
Manual Hammer	D 2168	Soils IHCP #26	Check mass and critical dimensions	12
Compaction Molds <sup>1</sup> (4 in. and 6 in.)	N/A	Tex-905-K	Check critical dimensions and volume	12
Direct Shear Loading Device	E 4, T 236	N/A	LVDT verification	12
Liquid Limit Device	T 89/D 4318	Tex-198-E, Soils IHCP #7	Check wear and critical dimensions	12
Grooving Tool	T 89/D 4318	Tex-198-E, Tex-104-E, Soils IHCP #6	Check critical dimensions	12
Hydrometers	T 88/D 422	N/A	Check critical dimensions	24
Straightedge	T 99, T 134, T 135, T 136, T 180 / D 558, D 559, D 560, D 698, D 1557, D 3740	Soils IHCP #25	Check planeness of edge  Central Laboratory's accreditation for D3740 requires a 6-month calibration interval	12
Weighted Foot Assembly	T 176/D 2419	N/A	Check mass	12

1. Equipment calibrated by the Department MTD Calibration.

### Aggregate Testing Equipment

<b>Equipment</b>	<b>Test Method (AASHTO/ASTM)</b>	<b>Department Test Method Used for Calibration (In-House Calibration or Equivalent)</b>	<b>Calibration Requirement</b>	<b>Max Interval (months)</b>
Unit Weight Measures <sup>1</sup>	T 19/C 29	Tex-905-K	Standardize	12
Sulfate Oven	T 104/C 88	N/A	Check rate of evaporation	12
Sulfate Soundness Sample Containers	T 104/C 88	Aggregates IHCP #23	Check physical condition	12
L.A. Machine and Steel Balls	T 96 / C 131	Aggregates IHCP #18, Tex-410-A, Tex-498-A	L.A. Machine: Check RPM and critical dimensions  Steel Balls: Check individual weight and charge weight	24  24
Micro-Deval Abrasion Machine and Steel Balls	N/A	Tex-461-A	Steel Balls: Check individual size	12
Conical Mold, Tamper	T 84/C 128	Tex-403-A, Tex-498-A, Aggregates IHCP #17	Check critical dimensions	24
Weighted Foot Assembly (Sand Equivalent)	T 176/D 2419	N/A	Check mass	12
Wet Ball Mill	N/A	Tex-116-E	Critical dimensions and weight of spheres	12

1. Equipment calibrated by the Department MTD Calibration Branch.

### Hydraulic Cement Concrete Testing Equipment

Equipment	Test Method (AASHTO/ASTM)	Department Test Method Used for Calibration (In-House Calibration or Equivalent)	Calibration Requirement	Max Interval (months)
Unit Weight Measures	T 121/C 138	Tex-905-K	Standardize	12
Unit Weight Measure for Bucket Volume Only <sup>1</sup>	T 121/C 138	Tex-905-K	Standardize	12
Air Meters (Pressure) <sup>2</sup>	T 152/C 231	Tex-416-A (C 231)	Standardize	3
Air Meters (Volumetric) <sup>2</sup>	C 173, T 196	Tex-414-A	Standardize	12
Compression, Loading, or Tensile Testing Devices	E 4/C 39	Tex-418-A	Standardize	12
Capping Material	C 617	Tex-450-A, Part II	Check strength	3
Slump Cones	T 119/C 143	Tex-514-C	Check critical dimensions	12
Single-Use Molds	T 22, T 23 / C 31, C 39	N/A	Check dimensions of each shipment	—
Recording Thermometer (Chart Recorder) <sup>2</sup>	C 31, C 39, E 77	N/A	Standardize	6

1. Equipment calibrated by the Department MTD Calibration Branch.

2. Individual test methods specify conditions that require re-standardization, such as changes in elevation and rough handling.

### Steel Laboratory Testing Equipment

Equipment	Test Method (AASHTO/ASTM)	Department Test Method Used for Calibration (In-House Calibration or Equivalent)	Calibration Requirement	Max Interval (months)
MTS 220 Kip Load Frame	E4	N/A	N/A	12
MTS 550 Kip Load Frame	E4	N/A	Standardize	12
Instron 60 Kip Load Frame	E4	N/A	Standardize	12
Extensometers/LVDTs for MTS Load Frames	E83 / E2309	N/A	Standardize	12
Extensometers/LVDTs for Instron Load Frame	E83 / E2309	N/A	Standardize	12
Brinell Hardness Tester	E10	N/A	Standardize	12
Rockwell Hardness Tester	E18	N/A	Standardize	12

### Hydraulic Cement Testing Equipment

Equipment	Test Method (AASHTO/ASTM)	Department Test Method Used for Calibration (In-House Calibration or Equivalent)	Calibration Requirement	Max Interval (months)
Moist Cabinet/ Water Tank Recording Thermometer	T 106 / C 109, C 511	Tex-307-D	Standardize	6
Storage Water	T 106 / C 109, C 511	Tex-307-D	Check for lime saturation	6
No. 325 Sieves	T 192 / C 430	Tex-312-D	Clean after 5 determinations, standardize after 100 determinations	—
No. 325 Nozzle	T 192 / C 430	Tex-312-D	Check flow rate	6
Wagner Turbidimeter	T 98 / C 115	Tex-309-D	Standardize	6
Standard Sand	C 778	N/A	Check each new shipment for conformance to C 778	—
Air-Permeability Apparatus	T 153 / C 204	Tex-311-D	Standardize using NIST 114 <sup>1</sup>	30
Bearing Blocks	T 106 / C 109	N/A	Check planeness	12
Flow Tables	M 152 / C 230	N/A	Standardize flow results <sup>1</sup>	30
Air Content Measurers	T 137 / C 185	Tex-305-D	Standardize <sup>1</sup>	30
Cube Molds and Tampers	T 106 / C 109	Tex-307-D	Check critical dimensions and physical condition <sup>1</sup>	30
Vicat Apparatus and Vicat Ring	T 129, T 131, T 186, C 187, C 191, C 451	Tex-301-D, Tex-303-D, Tex-313-D	Check physical condition, critical dimensions, and mass <sup>1</sup>	30
Mechanical Mixing Apparatus	T 162 / C 305	Tex-306-D	Check critical clearances and speeds <sup>1</sup>	30

1. The equipment evaluation provided by CCRL during their routine inspection satisfies the requirement.

### Chemical Laboratory Testing Equipment

Equipment	Test Method (AASHTO/ASTM)	Department Test Method Used for Calibration (In-House Calibration or Equivalent)	Calibration Requirement	Max Interval (months)
Gas Chromatograph	N/A	N/A	A standard must be run (calibration performed) before conducting each test, and noted in SM as applicable for that test	each use
Fourier Transform Infrared Spectrometer (FTIR), Tensor 37	N/A			Internal automatic calibration
pH Meters	N/A			each use
Ion Chromatograph (IC)	D 4327			each use
Gas Detection System	N/A	N/A	Refer to manufacturer's instructions	3
Freezer	N/A	N/A	N/A	12
General Purpose and Analytical Balances and Scales <sup>1</sup>	M 231, E 989	Tex-900-K, Tex-901-K	Standardize	12
Load Cells <sup>1</sup>	E 4, E 74	Tex-902-K	Standardize	12

1. Equipment calibrated by the Department MTD Calibration.

