

State of Illinois
Department of Transportation
Bureau of Materials
Springfield

POLICY MEMORANDUM

Revised: February 20, 2020

21-08.3

This Policy Memorandum supersedes number 21-08.2 dated February 13, 2018

TO: REGIONAL ENGINEERS AND HIGHWAY BUREAU CHIEFS

SUBJECT: MINIMUM DEPARTMENT AND LOCAL AGENCY LABORATORY
REQUIREMENTS FOR CONSTRUCTION MATERIALS TESTING OR MIX
DESIGN

1.0 SCOPE

This policy governs the minimum qualifications for materials testing laboratories operated by the **Department**. Federal regulations require the use of "**Qualified Laboratories**" for acceptance testing.

It applies to four categories of materials testing:

1. Soils
2. Aggregate (Agg)
3. Hot-mix asphalt (HMA)
4. Portland cement concrete (PCC)

Minimum qualifications for materials testing laboratories operated by **Local Agencies** are also contained herein.

2.0 PURPOSE

1. To ensure that **District and Local Agency Laboratories** are equipped and maintained at a uniform and high level of quality.
2. To establish uniform procedures for evaluating and approving **District and Local Agency Laboratories**.
3. To maintain a uniform standard for inspecting test equipment and test procedures.

3.0 AUTHORITY AND REFERENCES

3.1 **Authority.** Federal regulations (23 CFR Part 637) require the **Department** to establish an **Acceptance Program** for qualifying construction testing laboratories.

3.2 **References.**

1. IDOT Standard Specifications for Road and Bridge Construction.
2. IDOT Manual of Test Procedures for Materials.
3. IDOT QC/QA Specifications for Hot-Mix Asphalt and Portland Cement Concrete.
4. AASHTO, ASTM, and IDOT Test Procedures.

5. Code of Federal Regulations (23 CFR Part 637).
6. Department Policy MAT-15, "Quality Assurance Procedures for Construction."
7. IDOT Bureau of Local Roads and Streets Manual

4.0 DEFINITIONS

AASHTO - American Association of State Highway and Transportation Officials.

AASHTO R 18 - The **AASHTO** Standard for "Establishing and Implementing a Quality System for Construction Materials Laboratories." The principles and/or requirements of **AASHTO R 18** are used by the **Bureau** to administer the **Qualified Laboratory** program for **District Laboratories**.

AASHTO RE:SOURCE - Administrator of the Accreditation, Laboratory Assessment, and Proficiency Sample Programs for **AASHTO** (formerly the American Materials Reference Laboratory or AMRL). Re:source is part of the Engineering and Technical Services Division of **AASHTO**.

ACCEPTANCE PROGRAM – All factors that comprise the **Department's** determination of the quality of the product as specified in the contract requirements. These factors include verification (**QA**) sampling, testing, and inspection and may include results of **QC** sampling and testing.

ASTM - American Society for Testing Materials.

ASTM C 1077 - The **ASTM** "Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation" The principles and/or requirements of **ASTM C 1077** are used by the **Bureau** to administer the **Qualified Laboratory** program for **District Laboratories**.

BUREAU - Central Bureau of Materials (CBM), Illinois **Department** of Transportation.

BUREAU LABORATORY - The **Department's** central laboratory maintained and operated by the **Bureau**. The **Bureau Laboratory** administers the **Qualified Laboratory** program for **District** and **Private Laboratories**.

CCRL - Cement and Concrete Reference Laboratory.

DEPARTMENT - Illinois Department of Transportation (IDOT), including its **Districts** and Central Bureau offices.

DISTRICT - District office, Illinois **Department** of Transportation.

DISTRICT BRANCH LABORATORY - A **Department** laboratory operated by a **District** that is secondary to the **District Main Laboratory**.

DISTRICT LABORATORY - A **Department** laboratory that is operated by a **District**.

DISTRICT MAIN LABORATORY - The primary **Departmental** laboratory operated by a **District**.

FIELD TESTS - Tests that may be performed outside of a laboratory. For example, a portland cement concrete (PCC) or hot-mix asphalt (HMA) test performed at the jobsite.

INDEPENDENT ASSURANCE - Activities that are an unbiased and independent evaluation of all the sampling and testing (or inspection) procedures used in the quality assurance program. [IA provides an independent verification of the reliability of the acceptance (or verification) data obtained by the agency and the data obtained by the contractor. The results of IA testing or inspection are not to be used as a basis of acceptance. IA provides information for quality system management.] Policies and procedures contained in this memorandum are also an aspect of independent assurance.

LOCAL AGENCY - Governmental agency such as a county, city, or municipality.

LOCAL AGENCY LABORATORY - A laboratory operated by a **Local Agency**.

NIST - National Institute for Standards and Technology.

QUALIFIED LOCAL AGENCY REPRESENTATIVE (QLAR) - A county engineer, public works director, municipal engineer, or consultant engineer acting as a representative. Public works directors, municipal engineers, and consultant engineers shall be Licensed Professional Engineers in the state of Illinois.

QUALIFIED LABORATORY - A laboratory that is inspected and approved by the **Department**. FHWA's regulations (23 CFR 637.203) define these as *Laboratories that are capable as defined by appropriate programs established by each state transportation department. As a minimum, the qualification program shall include provisions for checking test equipment, and the laboratory shall keep records of calibration checks.*

QUALIFIED PERSONNEL - Personnel with demonstrated and documented capability to perform the applicable inspection and testing. The minimum requirement for aggregate, hot-mix asphalt or portland cement concrete testing is successful completion of the prescribed **Department** Quality Management Training Program classes.

QUALITY ASSURANCE (QA) - All those planned and systematic actions necessary to provide adequate **Department** confidence that materials; manufactured, fabricated or constructed items; processes; products; designs; conducted test procedures; etc. will satisfy the requirements of the **Specifications**, Quality Control Plan, etc., as applicable.

QUALITY CONTROL (QC) - The sum total of activities performed by a Producer, Contractor, Consultant, Manufacturer, etc. to make sure materials; manufactured, fabricated or constructed items; processes; products; designs; conducted test procedures; etc. will satisfy the requirements of the **Specifications**, Quality Control Plan, etc., as applicable.

SPECIFICATIONS - Specifications for materials; manufactured, fabricated or constructed items; processes; products; designs; conducted test procedures, etc. which includes the **Standard Specifications**, supplemental specifications and recurring special provisions, highway standards, shop drawings, contract plans, project special provisions, **AASHTO Specifications**, **ASTM Specifications**, etc., as applicable.

STANDARD SPECIFICATIONS - The **Department's** Standard Specifications for Road and Bridge Construction.

TECHNICAL MANAGER - The individual with responsibility for the overall operations, condition, and maintenance of a laboratory.

STATE - The state of Illinois.

5.0 DISTRICT MAIN AND BRANCH LABORATORY REQUIREMENTS

5.1 Personnel Qualifications/Responsibilities.

5.1.1 All testing related to contractor pay, **Quality Assurance**, and **Independent Assurance** shall be performed by **Qualified Personnel**.

5.1.2 The **Department** will maintain a computer database of **Qualified Personnel** who have successfully passed the appropriate Quality Management Training Program classes.

5.1.3 **Local Agency** employees may be certified as **Qualified Personnel** based on prior training and related work experience by the **QLAR** according to the Bureau of Local Roads and Streets Manual Section 13-3.01(a). A Certification of **Local Agency** Material Test Procedures [Forms BMPR 13310](#) shall be submitted for each employee to the **District**.

5.2 Facilities and Equipment.

5.2.1 The **Bureau** will approve all **District Main** and **Branch Laboratories**.

5.2.2 Each **District Main Laboratory** shall maintain the equipment and facilities necessary to perform the required tests outlined in Table 1 located in Attachment A. If a **District** operates one or more **Branch Laboratories**, it is not necessary that all tests outlined in Table 1 be performed at each branch facility.

5.2.3 Each **District Laboratory** shall have adequate floor space to efficiently conduct the required tests.

5.2.4 Each **District Laboratory** shall have HVAC equipment capable of maintaining a room temperature of 20 to 30° C (68-86° F). A **District Branch Laboratory** that performs only aggregate gradation and/or aggregate moisture testing is exempt from this requirement.

5.2.5 Each **District** may have additional testing capabilities, including the optional tests listed in Table 1 located in Attachment A.

5.2.6 The **District** will approve all **Local Agency Laboratories**.

5.2.7 Each **Local Agency Laboratory** shall maintain the equipment and facilities necessary to perform the tests outlined on the submitted Certification of **Local Agency** Material Test Procedures [Forms BMPR 13310](#).

6.0 QUALIFIED LABORATORY CRITERIA

- 6.1 **Qualified District Laboratories.** Each **District** shall maintain **Qualified Laboratories**.
- 6.2 **Test Procedures.** All test procedures shall be performed as specified in the current Manual of Test Procedures for Materials.
- 6.3 **Technical Manager.** Each **District Laboratory** shall have a **Technical Manager** (however titled) who has overall responsibility for the technical operations of the laboratory. The **Technical Manager** shall be responsible for equipment maintenance, calibration, standardization, verification and checks; maintaining records; and ensuring that current test procedures are utilized.
- 6.4 **Equipment Calibration, Standardization, Verification and Checks (C/S/V/C).** All **District Main** and **Branch Laboratory** equipment shall be calibrated, standardized, verified or checked according to Attachment A Table 2. The table also provides descriptive notes and links to forms that may be used to document lab equipment C/S/V/Cs. Heavy use or specific test requirements may require more frequent intervals than those given in Attachment A Table 2.
- 6.5 **Proficiency Testing.** **District Laboratory** qualifications may include round-robin proficiency testing conducted by the **Bureau**. Results of proficiency testing may be considered in the overall evaluation of the **District Laboratory** to conduct specific tests. (e.g., the superpave gyratory compactor and binder ignition oven may be approved through round robin proficiency testing.)

District Laboratories shall participate in the **AASHTO** Proficiency Sample Program (PSP) for Hot Mix Asphalt Solvent Extraction, Ignition Oven, and Gyratory samples; as applicable.

- 6.6 **Qualified Local Agency Laboratories.** Each **Local Agency** shall maintain **Qualified Laboratories** to perform the outlined tests on the submitted Certification of **Local Agency** Material Test Procedures [Forms BMPR 13310](#). Equipment calibration, standardization, verification and checks shall be according to Attachment A Table 2, as applicable.
- 6.7 **Records.**
- 6.7.1 **Test Records.** Each **District and Local Agency Laboratory** shall maintain test records which contain sufficient information to permit verification of any test report. Retention shall be according to **District** or **Local Agency** policies, as applicable.
- 6.7.2 **Laboratory Quality Records.** Each **District and Local Agency Laboratory** shall maintain documentation of internal quality controls. At a minimum, the records shall include:
1. Documentation of assignment of personnel responsible for internal quality controls.
 2. Documentation of equipment calibration, standardization, verification and checks.
 3. All documentation shall be maintained and available for inspection for a period of three years.

6.7.2.1 Equipment Calibration, Standardization, Verification and Check Records. Calibration, standardization, verification and check records shall include the minimum information listed below.

1. Description.
2. Model & Serial Number.
3. Name of person calibrating, standardizing, verifying or checking.
4. Equipment used for calibration, standardization, verification or checks (e.g., standard weights, proving rings, thermometers).
5. Date calibrated, standardized, verified, or checked & next due date.
6. Reference procedure used.
7. Results of calibration, standardization, verification or checks.

6.7.3 Proficiency Sample Records. Each **District Laboratory** shall retain results of participation in any proficiency sample program, including the documentation of steps taken to determine the cause of poor results and corrective action taken. Retention shall be according to **District** and/or **Bureau** policies.

7.0 LABORATORY INSPECTIONS

7.1 **General.** The **Bureau** will approve **District Laboratories** by inspection and other requirements, as applicable. The **District** will approve **Local Agency Laboratories** by inspection and other requirements, as applicable.

7.2 **Qualified Laboratory Inspection Scope and Procedure.**

7.2.1 The inspections will include:

1. Facilities - Physical and environmental conditions.
2. Equipment - Test apparatus for specification compliance.
3. Documentation - Calibration, standardization, verification and check records.
4. Personnel - A review of **Qualified Personnel** credentials.
5. Observation – **Qualified Laboratories** may be required to demonstrate all required and/or optional tests. Some test procedures, such as **Field Tests**, may be evaluated through discussion with laboratory personnel.
6. Report - The **Qualified Laboratory** will be provided with an inspection report listing those tests for which it is approved. The report will note if a required test is not performed by all laboratories in a **District**. For this case, the laboratory shall not perform the test for design or construction purposes. The report will note deficiencies.

7.2.2 Appropriate personnel from the **Qualified Laboratory** shall investigate and correct noted deficiencies. A memorandum concerning resolution of the deficiencies shall be submitted to the **Bureau** or **District**, as appropriate, within 60 days of the date of the report. Any uncorrected deficiencies may be waived only with the written approval of the **Bureau Chief**, or **District Materials Engineer**, as appropriate.

- 7.3 **Re-Inspection of Qualified Laboratories.** **Bureau** re-inspection of **District Main and Branch Laboratories** shall be conducted every two years. **District** re-inspection of **Local Agency Laboratories** shall be conducted every two years.

8.0 LABORATORY DATABASE

The **Bureau** is responsible for maintaining a database that monitors the approval status of **Department and Private Laboratories**. Online queries and reports are available to the Districts to assist them in tracking Qualified Laboratories. **Districts** shall be responsible for updating the database with approval status of **Local Agency Laboratories and Aggregate Only Private Laboratories**. The database will include the following information:

1. Laboratory Code
2. Responsible **District**
3. Type Laboratory (Agg, HMA, PCC, Soils, Other)
4. Demographics (Address, etc.)
5. Date Inspected
6. Approval Status

9.0 CLOSING NOTICE

Archived versions of this policy memorandum may be examined by contacting the **Bureau**.

The current **Bureau** Chief of Materials has approved this policy memorandum. Signed documents are on file with the **Bureau**.

**TABLE 1
DISTRICT LABORATORY TESTS**

AGGREGATE TESTS	PROCEDURE	Required	Optional	TITLE
	AASHTO / Illinois Test Procedure (ITP)			
	ITP 2	√		Sampling of Aggregates
	ITP 11	√		Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
	ITP 19		√	Bulk Density ("Unit Weight") and Voids in Aggregate
	ITP 27	√		Sieve Analysis of Fine and Coarse Aggregate
	AASHTO T 37		√	Sieve Analysis of Mineral Filler for Hot Mix Asphalt (HMA)
	ITP 84 ¹		√	Specific Gravity and Absorption of Fine Aggregate
	ITP 85 ¹		√	Specific Gravity and Absorption of Coarse Aggregate
	ITP 248	√		Reducing Samples of Aggregate to Testing Size
ITP 255		√	Total Evaporable Moisture Content of Aggregate by Drying	
ITP 306		√	Voids Test of Coarse Aggregate for Concrete Mixtures	

Note 1: Districts with slag producers are required to perform ITP 84 and 85.

**TABLE 1 (CONT'D)
 DISTRICT LABORATORY TESTS**

HOT MIX ASPHALT TESTS	PROCEDURE AASHTO (Illinois Modified) / ASTM (Illinois Modified)	Required	Optional	TITLE
	AASHTO T 30 (IL)	√		Mechanical Analysis of Extracted Aggregate
	AASHTO TP 124 (IL)	√		Standard Method of Test for Determining the Fracture Potential of Asphalt Mixtures Using the Flexibility Index Test (FIT)
	AASHTO T 164 (IL)	√		Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA)
	AASHTO T 166 (IL)	√		Bulk Specific Gravity (Gmb) of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface-Dry Specimens
	AASHTO T 209 (IL)	√		Theoretical Maximum Specific Gravity (Gmm) and Density of Hot Mix Asphalt Paving Mixtures
	AASHTO T 283 (IL)	√		Resistance of Compacted Hot Mix Asphalt (HMA) to Moisture-Induced Damage
	AASHTO T 287 (IL)		√	Asphalt Binder Content of Asphalt Mixtures by the Nuclear Method
	AASHTO T 308 (IL)	√		Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method
	AASHTO T 312 (IL)	√		Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyrotory Compactor
	AASHTO T 324 (IL)	√		Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)
ASTM D 2950 (IL)	√		Density of Bituminous Concrete in Place by Nuclear Methods	

**TABLE 1 (CONT'D)
DISTRICT LABORATORY TESTS**

SOILS TESTS	PROCEDURE AASHTO (Illinois Modified) / Illinois Test Procedure (ITP)	Required	Optional	TITLE
	AASHTO R 45		√	Installing, Monitoring, and Processing Data on the Traveling Type Slope Inclinometer
	AASHTO R 58	√		Dry Preparation of Disturbed Soil and Soil-Aggregate Samples for Test
	AASHTO T 88	√		Particle Size Analysis of Soils
	AASHTO T 89	√		Determining the Liquid Limit of Soils
	AASHTO T 90	√		Determining the Plastic Limit and Plasticity Index of Soils
	AASHTO T 99 (IL)	√		Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12 in.) Drop
	AASHTO T 100		√	Specific Gravity of Soils
	AASHTO T 134 (IL)		√	Moisture-Density Relations of Soil-Cement Mixtures
	AASHTO T 135		√	Wetting-and-Drying Test of Compacted Soil-Cement Mixtures
	AASHTO T 136		√	Freezing-and-Thawing Tests of Compacted Soil-Cement Mixtures
	AASHTO T 146		√	Wet Preparation of Disturbed Soil Samples for Test
	AASHTO T 180 (IL)		√	Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
	AASHTO T 191 (IL)		√	Density of Soil In-Place by the Sand-Cone Method
	AASHTO T 208		√	Unconfined Compressive Strength of Cohesive Soil
	AASHTO T 216		√	One-Dimensional Consolidation Properties of Soil
	AASHTO T 217 (IL)		√	Determination of Moisture in Soils by Means of a Calcium Carbide Gas Pressure Moisture Tester
	AASHTO T 223		√	Field Vane Shear Test in Cohesive Soils
	AASHTO T 265 (IL)	√		Laboratory Determination of Moisture Content of Soils
	AASHTO T 296		√	Unconsolidated, Undrained, Compressive Strength of Cohesive Soils in Triaxial Compression
AASHTO T 297		√	Consolidated, Undrained Triaxial Compression Test on Cohesive Soils	
Illinois Bearing Ratio (IBR)		√	(Refer to Geotechnical Manual)	

**TABLE 1 (CONT'D)
DISTRICT LABORATORY TESTS**

PORTLAND CEMENT CONCRETE TESTS	<u>PROCEDURE</u>	Required	Optional	TITLE
	AASHTO M 201 (IL)		√	Moist Cabinets, Moist Rooms, and Water Storage Tanks used in the Testing of Hydraulic Cements
	AASHTO R 39 (IL)		√	Making and Curing Concrete Test Specimens in the Laboratory
	AASHTO R 60 (IL)	√		Sampling Freshly Mixed Concrete
	AASHTO T 22 (IL)	√		Compressive Strength of Cylindrical Concrete Specimens
	AASHTO T 23 (IL)	√		Making and Curing Concrete Test Specimens in the Field
	AASHTO T 97		√	Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
	AASHTO T 119 (IL)	√		Slump of Hydraulic Cement Concrete
	AASHTO T 121 (IL)	√		Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
	AASHTO T 152 (IL)	√		Air Content of Freshly Mixed Concrete by the Pressure Method
	AASHTO T 177 (IL)	√		Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)
	AASHTO T 196 (IL)		√	Air Content of Freshly Mixed Concrete by the Volumetric Method
	AASHTO T 197		√	Time of Setting of Concrete Mixtures by Penetration Resistance
	AASHTO T 231 (IL)		√	Capping Cylindrical Concrete Specimens
	AASHTO T 318 (IL)		√	Water Content of Freshly Mixed Concrete Using Microwave Oven Drying
	ASTM C 1064 (IL)	√		Temperature of Freshly Mixed Hydraulic Cement Concrete
	ASTM C 1231 (IL)		√	Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders
	ITP 301		√	Fine Aggregate Moisture Content by the Flask Method
	ITP 302		√	Aggregate Specific Gravity and Moisture Content by the Dunagan Method
	ITP 303		√	Fine or Coarse Aggregate Moisture Content by Pycnometer Jar Method
ITP 306		√	Void Test of Coarse Aggregate for Concrete Mixtures	

**TABLE 2
 EQUIPMENT CALIBRATION, STANDARDIZATION, VERIFICATION AND CHECK SCHEDULE**

EQUIPMENT	REQUIREMENT	MAX. INTERVAL (MONTHS)	FORM AND/OR PROCEDURE
GENERAL			
General Purpose Balance and Scale	Commercial Service or Verification using Standardized NIST Traceable Masses	12	BMPR QCD01
Standard Masses	Standardize	60	Outside Calibration
Caliper	Standardize	12	BMPR QCD02
Micrometer	Standardize	12	BMPR QCD03
Testing Oven	Standardize Thermometric Device	12	BMPR QCD04
Working Thermometer	Standardize with Calibrated NIST Traceable Reference Thermometer	12	BMPR QCD05
Reference Thermometer	Calibrate	60	Outside Calibration
Timer	Check Accuracy	12	BMPR QCD06
Caliper Checker	Calibrate	60	Outside Calibration
Gauge Blocks	Calibrate	60	Outside Calibration
AGGREGATE			
Mechanical Shaker	Check Sieving Thoroughness	12	BMPR QCD07
Agg. Unit Weight Measure	Standardize	12	BMPR QCD08
Conical Mold and Tamper	Check Critical Dimensions	24	BMPR QCD09
Coarse Sieves (Openings ≥ 4.75 mm)	Check Overall Physical Condition and Dimensions of Openings	12	BMPR QCD10 Calipers BMPR QCD11 Go/No-Go Gauges
Fine Sieves (Openings <4.75 mm)	Check Overall Physical Condition	12	BMPR QCD12

EQUIPMENT	REQUIREMENT	MAX. INTERVAL (MONTHS)	FORM AND/OR PROCEDURE
HOT MIX ASPHALT			
Gyratory Compactor	Verify Angle ¹ , Pressure, and Height	Once a Month During Use	Manufacturer's Instructions ¹
	Verify Angle using a DAV-2	12	MTP Appendix B.19
Molds, Base Plates, Ram Face	Check Critical Dimensions	12	BMPR QCD13
Tensile Strength Machine	Verification	12	CBM ASTM E4
Ignition Furnace Balance	Commercial Service or Verification using Standardized NIST Traceable Masses	12	BMPR QCD01
Manometer and Vacuum Pump	Standardize and Check Pressure	12	BMPR QCD14
TSR Breaking Head	Check Critical Dimensions	12	BMPR QCD15
Pycnometer	Standardize Volume	12	BMPR QCD16
Water Baths	Standardize	12	BMPR QCD17
Bore Gauge	Standardize	Each Use	IL Mod AASHTO T312
Master Ring	Calibrate	When concern of damage	Outside Calibration
Hamburg Wheel Tracking Machine:			BMPR QCD18
Water Temperature	Verification	6	
Speed	Verification	12	
Wheel Weight	Verification	24	
LVDT'S	Verification	12	
I-FIT	Verify with Validator	Once a Month During Use	See I-FIT Validator Lab Worksheet
Moisture/Density Nuclear Gauge ²	Calibration	12	CBM Nuclear Lab
Asphalt Content Gauge	Verification	12	CBM Nuclear Lab
	Calibration	24	CBM Nuclear Lab

EQUIPMENT	REQUIREMENT	MAX. INTERVAL (MONTHS)	FORM AND/OR PROCEDURE
SOILS			
Compression Loading Device	Verification	12	CBM ASTM E4
5.5 lb. Mechanical Compactor	Standardize	12	BMPR QCD19
10 lb. Mechanical Compactor	Standardize	12	BMPR QCD20
5.5 lb. Manual Hammer	Check Weight and Critical Dimensions	12	BMPR QCD21
10 lb. Manual Hammer	Check Weight and Critical Dimensions	12	BMPR QCD22
Proctor Mold 4 inch	Check Critical Dimensions	12	BMPR QCD23
Proctor Mold 6 inch	Check Critical Dimensions	12	BMPR QCD24
Proctor Mold Factor	Determine Factor and Volume	12	BMPR QCD25
Straightedge	Check Critical Dimensions	12	BMPR QCD26
Liquid Limit Device	Check Wear and Performance	12	BMPR QCD27
Grooving Tool	Check Critical Dimensions	12	BMPR QCD28
Hydrometer Bulb	Check Critical Dimensions	24	BMPR QCD29
	Determine Composite Correction	12	BMPR QCD30
Vacuum System and Gauge	Standardize	12	BMPR QCD31
Specific Gravity Pycnometer	Standardize	Initial Use	BMPR QCD32
Dynamic Cone Penetrometer	Check Physical Dimensions	12	BMPR QCD33
Rimac	Standardize	24	CBM Soils Lab
SPT Hammer (Drill Rig)	Dynamic Energy Measurement	24	CBM Nuclear Lab
PDA (Pile Driving Analyzer) Equipment	Calibration	24	Manufacturer's Calibration

EQUIPMENT	REQUIREMENT	MAX. INTERVAL (MONTHS)	FORM AND/OR PROCEDURE
PORTLAND CEMENT CONCRETE			
PCC Unit Weight Measure	Standardize	12	BMPR QCD34 Unit Weight Bucket BMPR QCD35 Air Meter Bowl
Air Meter (Pressure Type)	Standardize	12 (Type A)	BMPR QCD36
	Standardize	3 (Type B)	BMPR QCD37
Air Meter (Volumetric Type)	Standardize	12	BMPR QCD38
Capping Material	Check Strength	3 or New Shipment	BMPR QCD39
Slump Cone	Check Critical Dimensions	12	BMPR QCD40
Beam Mold	Check Critical Dimensions	12	BMPR QCD41
Plastic Cylinder Mold 4 x 8	Check Dimensions	Each Shipment	BMPR QCD42
Plastic Cylinder Mold 6 x 12	Check Dimensions	Each Shipment	BMPR QCD43
Compression Testing Machine	Verification	12	CBM ASTM E4
Flexural Strength Testing Machine	Verification	12	CBM ASTM E4 or District Procedure
Retaining Rings and Neoprene Pads	Check of Critical Dimensions and Neoprene Pad Usage	12	BMPR QCD44
Metal Stem Thermometer	Standardize with Calibrated NIST Traceable Reference Thermometer	12	BMPR QCD45
Moist Room/Storage Tank Recording Thermometer or Max/Min Thermometer	Standardize with Calibrated NIST Traceable Reference Thermometer	12	BMPR QCD46

Note 1: See Manual of Test Procedures Appendix B.19 for permissible verification procedures.

Note 2: Also used in soils testing.