POLICY MEMORANDUM

TO: REGIONAL ENGINEERS AND HIGHWAY BUREAU CHIEFS
AND ASR TESTING LABORATORIES

SUBJECT: MINIMUM LABORATORY REQUIREMENTS FOR ALKALI-
SILICA REACTIVITY (ASR) TESTING

1.0 DEFINITIONS

AASHTO R 18 - The American Association of State Highway and Transportation Officials (AASHTO) Standard for "Establishing and Implementing a Quality System for Construction Materials Laboratories." The principles of AASHTO R 18 are used by the Bureau of Materials and Physical Research (BMPR) to administer the minimum laboratory requirements for ASR Testing Laboratories.

ALKALI-SILICA REACTIVITY (ASR) TESTING LABORATORY - Any laboratory that performs ASTM C 1567 and/or ASTM C 1293 tests. This includes Contractor, Producer, or Consultant laboratories.

BMPR LABORATORY - The Department's central laboratory maintained and operated by the Bureau of Materials and Physical Research (BMPR).

CONSULTANT - A Private firm which performs construction materials testing for the Department, Producer, or Contractor.

CONTRACTOR - The individual, firm, partnership, joint venture, or corporation contracting with the Department for performance of prescribed work.

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

PRODUCER - An individual or business entity providing materials for performance of prescribed work.

TECHNICAL MANAGER - The individual with responsibility for the overall operations, condition, and maintenance of the ASR Testing Laboratory.

2.0 SCOPE

This policy governs the minimum qualifications for Alkali-Silica Reactivity (ASR) Testing Laboratories operated by Contractors, Producers and Consultants.
3.0 **PURPOSE**

To ensure that **ASR Testing Laboratories** are equipped and maintained at a uniform and high level of quality.

To establish a uniform procedure for evaluating and approving **ASR Testing Laboratories**.

4.0 **REFERENCE DOCUMENTS**

IDOT Standard Specifications for Road and Bridge Construction.

Applicable Special Provisions.

AASHTO, ASTM, and IDOT Test Procedures.

5.0 **ALKALI-SILICA REACTIVITY TESTING LABORATORY REQUIREMENTS**

All alkali-silica reactivity testing for Department contracts shall be performed by **ASR Testing Laboratories** approved by the Department and listed on the **Approved Lists of Laboratories to Perform Alkali-Silica Reactivity (ASR) Tests** as maintained by the Department.

5.1 **Facilities and Equipment Requirements**

5.1.1 Each **ASR Testing Laboratory** approved by the Department to perform ASTM C 1293 shall have the following, at a minimum:

- HVAC equipment capable of maintaining a room temperature of 68-86 °F (20-30 °C) all year
- Specified, documented, source for nonreactive coarse and fine aggregates according to ASTM C 1293
- Specified, documented source for cement according to ASTM C 1293
- Moist room according to ASTM C 511 (e.g., temperature and relative humidity measuring device(s), humidification device, etc.)
- Temperature controlled storage environment capable of maintaining 100.4 ± 3.6 °F (38.0 ± 2.0 °C) according to ASTM C 1293
- Length comparator according to ASTM C 490
- Storage containers according to ASTM C 1293
- Sodium hydroxide (NaOH) according to ASTM C 1293
- One example of a mix design according to ASTM C 1293
- Ability to meet mixing requirements according to ASTM C 192, ASTM C 143, ASTM C 138, and ASTM C 157
- Copy of the Department’s Manual of Test Procedures for Materials

5.1.2 Each **ASR Testing Laboratory** approved by the Department to perform ASTM C 1567 shall have the following, at a minimum:

- Storage oven or water bath according to ASTM C 1567
- Controlled environment for mixing and molding according to ASTM C 1567
- Moist room according to ASTM C 511 (e.g., temperature and relative humidity measuring device(s), humidification device, etc.)
- Specimen molds according to ASTM C 490
• Gage studs according to ASTM C 490
• Length comparator according to ASTM C 490
• Reference bar according to ASTM C 490
• Storage containers according to ASTM C 1567
• Sodium hydroxide (NaOH) according to ASTM C 1567
• Type IV reagent water according to ASTM D 1193
• Nos. 4, 8, 16, 20, 30, 50, and 100 sieves according to ASTM E 11
• Tamper and trowel according to ASTM C 109
• Mixer, paddle, and bowl according to ASTM C 305
• Flow table according to ASTM C 230

6.0 QUALITY SYSTEM CRITERIA

6.1 Inspection

Each ASR Testing Laboratory approved by the Department to perform ASTM C 1567 shall have been inspected by the Cement and Concrete Reference Laboratory (CCRL) for that test.

Each ASR Testing Laboratory approved by the Department to perform ASTM C 1293 shall have been inspected by the Cement and Concrete Reference Laboratory (CCRL) for that test.

6.2 Technical Manager

Each ASR Testing Laboratory shall have a Technical Manager (however titled) who has overall responsibility for the technical operations of the ASR Testing Laboratory. The Technical Manager shall be responsible for equipment maintenance and calibration, maintaining records, and ensuring that current test procedures are utilized.

6.3 Equipment Calibration and Verification

The ASR Testing Laboratory or designee shall calibrate or verify all testing equipment associated with tests performed by the ASR Testing Laboratory. The frequency shall be per the test method.

6.4 Proficiency Testing

ASR Testing Laboratory qualifications will include successful comparison of ASTM C 1567 testing by the ASR Testing Laboratory and BMPR Laboratory. Results will be considered in the overall evaluation of the ASR Testing Laboratory to conduct ASTM C 1567.

Each ASR Testing Laboratory approved by the Department to perform ASTM C 1567 may be required to periodically participate in round-robin proficiency testing conducted by the Department.

Each ASR Testing Laboratory approved by the Department to perform ASTM C 1293 may be required to periodically participate in round-robin proficiency testing conducted by the Department.

Round-robin proficiency testing will be administered by the BMPR Laboratory. Round-robin proficiency tests shall begin within 2 weeks of receipt of materials, and
results shall be submitted to the **BMPR Laboratory** within 2 weeks of completion.

### 6.5 Records

**Test Records** – Each **ASR Testing Laboratory** shall maintain test records which contain sufficient information to permit verification of any test report.

**Records Retention** – Each **ASR Testing Laboratory** shall maintain documentation of the 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.
3. Logs of sample pick-up shall be maintained for a minimum period of three years.
4. All documentation shall be maintained and available to **Department** inspection for a period of three years.

**Equipment Calibration and Verification Records** – Calibration records shall include the minimum information listed below. **AASHTO R 18** and **ASTM C 1222 or ASTM C 1077** provides additional guidance for calibration of most testing equipment.

1. Description
2. Model & Serial Number
3. Name of person calibrating
4. Calibration equipment used (e.g., standard weights, proving rings, thermometers)
5. Date calibrated & next due date
6. Reference procedure used
7. Results of calibration /verification

**Technical Training and Evaluation Records** – Each **ASR Testing Laboratory** shall maintain records of technician training and evaluation.

### 6.6 Publications

Each **ASR Testing Laboratory** shall maintain current copies of all test procedures performed.

### 7.0 LABORATORY INSPECTIONS

#### 7.1 CCRL Inspected ASR Testing Laboratories

Inspection by CCRL of the **Contractor, Producer, or Consultant** laboratory is a prerequisite for approval as an **ASR Testing Laboratory**. A copy of the final CCRL inspection report shall be provided to the **BMPR Laboratory** or approval for access to the report by other means shall be given.

CCRL inspection does not waive the right of the **Department** to conduct inspections. The **BMPR Laboratory** will provide written notification to the **ASR Testing Laboratory**, indicating the approval. Approval will be based on the results of the CCRL inspection and the results of the ASTM C 1567 test by the **ASR Testing Laboratory**.
7.2 Re-Approval of ASR Testing Laboratories

The re-approval of ASR Testing Laboratories shall be conducted by the BMPR Laboratory at the next CCRL inspection. Re-approval will be based on the results of the CCRL Inspection. A copy of the final CCRL inspection report shall be provided to the BMPR Laboratory or approval for access to the report by other means shall be given.

If the BMPR Laboratory determines that satisfactory results were obtained from the CCRL inspection, the BMPR Laboratory will provide written notification of re-approval to the ASR Testing Laboratory.

8.0 APPROVED LABORATORY LISTS

The Department will maintain two lists of approved ASR Testing Laboratories on the Internet. The lists will be entitled “Approved List of Laboratories to Perform Alkali- Silica Reactivity (ASR) ASTM C 1293” and “Approved List of Laboratories to Perform Alkali- Silica Reactivity (ASR) ASTM C 1567”, and will include the following information:

1. Laboratory Name
2. Address
3. Contact Person and Phone No.
4. Approved Tests
5. Website

The Department may remove an ASR Testing Laboratory from the list if deficiencies in the facility, equipment, or test procedures are indicated through inspections, proficiency testing, or other circumstances, unless the ASR Testing Laboratory takes immediate action and corrects the deficiency.

David L. Lippert, P.E.
Engineer of Materials and Physical Research

JMK