December 17, 2014

Mr. John Thomas
Independent Assurance and QC Manager
Oklahoma Department of Transportation
200 Northeast 21st Street
Oklahoma City, Oklahoma 73105

Subject: Inspection of Cement, Pozzolan, and Concrete Testing Laboratories

Dear Mr. Thomas:

Enclosed is a confirmatory report on Inspection Number W-1087, which was completed in your testing laboratories at Oklahoma City, Oklahoma, on October 27, 2014, by representatives of the Cement and Concrete Reference Laboratory.

This letter, and the accompanying report, provide written evidence that your laboratories have been inspected during the 36th Inspection Tour.

Very truly yours,

Steven E. Lenker, P.E.
Director, Construction Materials Reference Laboratories
Cement and Concrete Reference Laboratory

Enclosure

cc: R. Toney
D. McCullough
Division Administrator, FHWA

Inspection Report Introduction

This report covers the cement, pozzolan, and concrete inspection conducted in the laboratories of the Oklahoma Department of Transportation, at Oklahoma City, Oklahoma. This inspection, designated as Inspection Number W-1087, was completed in the laboratories on October 17, 2014.

Inspections generally cover three areas: quality systems; testing equipment; and procedures. Under all material types inspected there will be a Summary of Findings and a Footnote Section. The Summary of Findings will denote items examined, which may include: documents, equipment and procedures performed by the laboratory. Entries in the Summary of Finding Section cover availability, physical condition, and/or conformance to specification requirements. These items, when checked, will indicate whether the items conformed to the ASTM standard or will state briefly any deviation from the standard and will be listed in the Footnote Section. The Footnote Section is also used to convey observations, recommendations or explanations of conditions found. When a footnote of this nature appears in a report it is labeled as an "Informational Footnote" in bold font. These informational footnotes do not require deficiency corrections.

Corrections of minor deficiencies are encouraged during the course of each inspection. In the interest of brevity, any adjustments of this nature which may have been made have not been mentioned in the report.

Several pieces of apparatus in the laboratory have been assigned CCRL identification numbers. Some of these numbers are listed in the Summary and Footnote Sections.

For a more in-depth description of the scope of each inspection, please see www.ccrl.us/Lip/lip.htm. The inspection was conducted using the most recent version of the applicable Book of ASTM Standards available at the time of the inspection, unless otherwise indicated in the Footnote Section of this report.

This report confirms the condition of the laboratory on the inspection date noted above. It does not approve, certify or accredit this laboratory; therefore, publicizing the inspection without offering a review of this report is prohibited.

CEMENT SUMMARY OF FINDINGS

Quality System

Inspection Item	Status
Quality System C1222-09	
• Organization	Satisfactory
• Human Resources	
· Director of Testing	Satisfactory
· Training	Satisfactory
· Performance Evaluation	Satisfactory
· Personnel Records	Satisfactory
• Operations	
· Standard Operating Procedures	Satisfactory
· Final Report	Satisfactory
• Quality	
· Technical Complaints	Satisfactory
· Proficiency Sample Testing	Satisfactory
· Standard Test Methods	Satisfactory
· Internal Quality System Review	Satisfactory
• Equipment	
· Inventory	Satisfactory
· Equipment Calibration	Satisfactory
· Records	Satisfactory
· Calibration Procedures	Satisfactory
Qualification of Chemical Analysis C114-11b	
• Frequency	Satisfactory
• Records:	

Analyte	Method	*Qualified
Aluminum Oxide	X-Ray	Satisfactory
Ferric Oxide	X-Ray	Satisfactory
Magnesium Oxide	X-Ray	Satisfactory
Potassium Oxide	X-Ray	Satisfactory
Titanium Dioxide	X-Ray	Satisfactory
Phosphorus Pentoxide	X-Ray	Satisfactory
Manganic Oxide	X-Ray	Satisfactory

*Entry covers conformance to permissible variations in data results as listed in Table 1 of C114.

Apparatus

Inspection Item	Status
Storage Facilities for Test Specimens C511-09	
• Moist Air Storage Facilities	See footnote (a)
• Water Storage Facilities	See footnote (a)
Wet Sieving Apparatus C430-08	
• 45-µm (No. 325) Sieve(s)	Satisfactory
• Accessory Apparatus	Satisfactory
Autoclave Soundness Apparatus C151-09 and C490-11	
• Autoclave(s):	
• Maker: Boekel Serial Number: 1011-21	Satisfactory
• Length Comparator(s) Number Checked: 1	Satisfactory
• Bar Mold(s) Number Checked: 4	Satisfactory
Graduates C1005-10	
• Capacity: 500 mL CCRL Number: J-237	Satisfactory
• Capacity: 150 mL CCRL Number: K-4011	Satisfactory
• Capacity: 250 mL CCRL Number: R-1761	Satisfactory
Flow Table C230-13	
• Flow Table(s):	
• Maker: Humboldt	Satisfactory
• Accessory Apparatus	Satisfactory
Compression Test Apparatus C109-12 and E4-13	
• Compression Testing Machine:	
• Maker: Tinius Olsen	
• Serial Number: 222424 Capacity: 60,000 lbf	
• Accuracy of Indication:	
· Range: 60,000 lbf From: 4,000 to 36,000 lbf	Satisfactory
• Mechanical Condition	Satisfactory
• Design	Satisfactory
• Bearing Blocks	Satisfactory
• Cube Molds: Number Checked: 11	Satisfactory
• Tampers	Satisfactory
Mix Balance(s) C1005-10	
• Maker: Mettler Toledo	
Capacity: 3,100 g CCRL Number: M-1142	Satisfactory
Vicat Apparatus C187-11, C191-08, and C451-08	
• Vicat Apparatus(es):	
• CCRL Number: P-280	Satisfactory
• CCRL Number: U-2450	Satisfactory
• Additional Vicat Rings: Number Checked: 10	Satisfactory
Gillmore Needles C266-08	
• Initial Needles: • Final Needles:	
• CCRL Number: J-3011 • CCRL Number: W-3262	Satisfactory
• Mountings:	Satisfactory

Inspection Item	Status
Mechanical Mixing Apparatus C305-13	
• Mixer(s):	
• Maker: Hobart Serial Number: 31-1229-744	Satisfactory
• Accessory Apparatus:	Satisfactory
Air Content Apparatus C185-08	
• 400 mL Measure(s)	Satisfactory
• Accessory Apparatus	Satisfactory
Air Permeability Apparatus C204-11	
• Blaine Meter(s):	
• CCRL Number: K-1620	Satisfactory
• Accessory Apparatus	Satisfactory
Standard Sands C778-13 and E11-13	
• Sand Verification	Satisfactory
• Sample Splitter	Satisfactory
• Sieves	Satisfactory
Miscellaneous	
• Temperature of Air in Laboratory	Satisfactory
• Relative Humidity of Air in Laboratory	Satisfactory
• Temperature of Mixing Water	Satisfactory

Procedures

Test	Method Reference	Technique in Exact Agreement With Standard Practice
Normal Consistency Test	C187-11 and C305-13	Yes
Vicat Time of Set Test (Method A)	C191-08 and C305-13	Yes
Preparation of:		
Gillmore Pat	C266-08 and C305-13	Yes
Autoclave Bars	C151-09 and C305-13	Yes
Mortar Cubes	C109-12, C305-13, and C1437-13	Yes
Testing of Autoclave Bars	C151-09	Yes
Testing of Mortar Cubes	C109-12	Yes
Air Content Determination	C185-08 and C305-13	Yes
No. 325 Sieve Fineness Test	C430-08	Yes
Air Permeability Fineness Test	C204-11	See footnote (b)
Handling of Samples	C183-08	Yes

CEMENT FOOTNOTE SECTION

Storage Facilities for Test Specimens (C511-09):

(a) The verification records for the temperature recorder did not include temperature readings of both the temperature recorder and the reference temperature measuring device as required in Sections 5.2.1.1 and 5.2.1.2 of C511.

Procedures:

(b) Air Permeability Fineness Test (C204-11): After compacting the bed of cement, the plunger was not removed slowly as required in Section 4.5 of C204. Further, the liquid was not pulled to the top mark and the test temperature was not compared to the standardization temperature as required in Section 4.6.2 of C204.

POZZOLAN SUMMARY OF FINDINGS

Apparatus

Inspection Item	Status
Storage Facilities for Test Specimens C511-09	
• Moist Air Storage Facilities	See footnote (a)
• Water Storage Facilities	See footnote (a)
Sieves C441-11 and E11-13	Satisfactory
Wet Sieving Apparatus C311-13 and C430-08	
• 45-µm (No. 325) Sieve(s)	Satisfactory
• Accessory Apparatus	Satisfactory
Autoclave Soundness Apparatus C151-09 and C490-11	
• Autoclave(s):	
• Maker: Boekel Serial Number: 1011-21	Satisfactory
• Length Comparator(s) Number Checked: 1	Satisfactory
• Bar Mold(s) Number Checked: 4	Satisfactory
Graduates C1005-10	
• Capacity: 500 mL CCRL Number: J-237	Satisfactory
• Capacity: 150 mL CCRL Number: K-4011	Satisfactory
• Capacity: 250 mL CCRL Number: R-1761	Satisfactory
Flow Table C230-13	
• Flow Table(s):	
• Maker: Humboldt	Satisfactory
• Accessory Apparatus	Satisfactory
Compression Test Apparatus C109-12 and E4-13	
• Compression Testing Machine:	
• Maker: Tinius Olsen	
• Serial Number: 222424 Capacity: 60,000 lbf	
• Accuracy of Indication:	
· Range: 60,000 lbf From: 4,000 to 36,000 lbf	Satisfactory
• Mechanical Condition	Satisfactory
• Design	Satisfactory
• Bearing Blocks	Satisfactory
• Cube Molds: Number Checked: 11	Satisfactory
• Tampers	Satisfactory
Mix Balance(s) C1005-10	
• Maker: Mettler Toledo	
Capacity: 3,100 g CCRL Number: M-1142	Satisfactory
Mechanical Mixing Apparatus C305-13	
• Mixer(s):	
• Maker: Hobart Serial Number: 31-1229-744	Satisfactory
• Accessory Apparatus:	Satisfactory

Inspection Item	Status
Vicat Apparatus C187-11	
• Vicat Apparatus(es):	
• CCRL Number: P-280	Satisfactory
• CCRL Number: U-2450	Satisfactory
• Additional Vicat Rings: Number Checked: 10	Satisfactory
Density C188-09	
• Density Equipment	Satisfactory
• Accessory Apparatus	Satisfactory
Loss on Ignition C114-11b and C311-13	
• Crucible	Satisfactory
• Muffle Furnace	Satisfactory
• Miscellaneous	Satisfactory
Standard Sands C778-13 and E11-13	
• Sand Verification	Satisfactory
• Sample Splitter	Satisfactory
• Sieves	Satisfactory
Miscellaneous	
• Temperature of Air in Laboratory	Satisfactory
• Relative Humidity of Air in Laboratory	Satisfactory
• Temperature of Mixing Water	Satisfactory
• ASTM Standards	Satisfactory

Procedures

Test	Method Reference	Technique in Exact Agreement With Standard Practice
Normal Consistency Test	C187-11 and C305-13	Yes
Preparation of:		
Autoclave Bars	C151-09, C305-13, and C311-13	Yes
Mortar Cubes	C109-12, C305-13, C311-13, and C1437-13	Yes
Testing of Autoclave Bars	C151-09	Yes
Testing of Mortar Cubes	C109-12	Yes
No. 325 Sieve Fineness Test	C311-13 and C430-08	Yes
Moisture Content	C311-13	Yes
Loss on Ignition	C114-11b and C311-13	Yes
Density	C188-09 and C311-13	Yes

POZZOLAN FOOTNOTE SECTION

Storage Facilities for Test Specimens (C511-09):

(a) The verification records for the temperature recorder did not include temperature readings of both the temperature recorder and the reference temperature measuring device as required in Sections 5.2.1.1 and 5.2.1.2 of C511.

CONCRETE SUMMARY OF FINDINGS

Quality System

Inspection Item	Status
Quality System C1077-13b	
• Organization	Satisfactory
• Human Resources	Satisfactory
• Operations	See footnote (a)
• Quality Assurance	See footnote (b)
• Equipment	Satisfactory

Apparatus

Curing Facilities C511-09	
• Moist Air Storage Facilities	See footnote (c)
• Water Storage Facilities	See footnote (c)
Compression Test Apparatus C39-12a and E4-13	
• Compression Testing Machine:	
• Maker: Forney	
• Serial Number: 06129 Capacity: 400,000 lbf	
• Accuracy of Indication:	
· Range: 400,000 lbf From: 50,000 to 100,000 lbf	Satisfactory
• Mechanical Condition	Satisfactory
• Design	Satisfactory
• Bearing Blocks for Cylinders	Satisfactory
Molds for Concrete Testing C31-12 and C470-09	
• Cylinder Molds for Four Inch Diameter Specimens	Satisfactory
• Beam Molds	Satisfactory
Specimen Shipping Containers C31-12	
• Four Inch Diameter Specimens	See footnote (d)
Capping Equipment and Materials C617-12	
• Capping Equipment for Four Inch Diameter Specimens	Satisfactory
• Capping Material	Satisfactory
• Conditions of Caps	Satisfactory
Unbonded Caps C1231-12	
• Retaining Rings and Pads for Four Inch Diameter Specimens	Satisfactory
• Accessory Apparatus	Satisfactory
Slump Cone(s) C143-12	Satisfactory
Tamping Rod(s) C31-12	Satisfactory
Concrete Vibrators C31-12, C138-13, and C231-10	Satisfactory
Temperature of Concrete C1064-12	Satisfactory
Reference Temperature Measuring Devices C511-09 and C1064-12	
• Reference Thermometer(s) - C511	Satisfactory
• Reference Thermometer(s) - C1064	Satisfactory

Inspection Item	Status
Unit Weight Apparatus C138-13	
• Unit Weight Measure(s)	Satisfactory
• Accessory Apparatus	Satisfactory
• Scale or Balance	Satisfactory
Air Content Apparatus (Volumetric) C173-12	
• Air Meter(s)	Satisfactory
• Accessory Apparatus	Satisfactory
Air Content Apparatus (Pressure) C231-10	
• Air Meter(s)	Satisfactory
• Accessory Apparatus	Satisfactory
• Aggregate Correction Factors	Satisfactory

Procedures

Test	Method Reference	Technique in Exact Agreement With Standard Practice
Slump of Concrete	C143-12	See footnote (e)
Unit Weight of Concrete	C138-13	See footnote (f)
Air Content (Volumetric Method)	C173-12	See footnote (g)
Air Content (Pressure Method)	C231-10	See footnote (h)
Sampling Freshly Mixed Concrete	C172-10	Yes
Measuring Temperature of Concrete	C1064-12	Yes
Fabrication of Cylinders	C31-12	Yes
Fabrication of Beams	C31-12	Yes
Curing of Cylinders	C39-12a	Yes
Bonded Caps:		
• Capping of Cylinders	C617-12	Yes
• Cylinder and Cap Checks	C617-12	Yes
Unbonded Caps:		
• Cylinder and Pad Cap Checks	C1231-12	Yes
• Alignment Checks	C1231-12	Yes
Cylinder Measurements	C39-12a	Yes
Compressive Strength of Cylinders	C39-12a	Yes

Additional Test Methods

	Status
Obtaining and Testing Drilled Cores and Sawed Beams of Concrete C42-13	
• Equipment	See footnote (i)
• Procedure	Satisfactory
Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading) C78-10	
• Equipment	See footnote (j)
• Procedure	Satisfactory
Measuring Thickness of Concrete Elements Using Drilled Concrete Cores C174-13	
• Equipment	See footnote (k)
• Procedure	Satisfactory

	Status
Making and Curing Concrete Test Specimens in the Laboratory C192-13	
• Equipment	Satisfactory
• Procedure	See footnote (l)
Fundamental Transverse, Longitudinal and Torsional Resonant Frequencies of Concrete Specimens C215-08	
• Equipment	Satisfactory
• Procedure	Satisfactory
Resistance of Concrete to Rapid Freezing and Thawing C666-03	
• Equipment	Satisfactory
• Procedure	Satisfactory

CONCRETE FOOTNOTE SECTION

Quality System (C1077-13b):

(a) **Information Footnote:** It was understood that, normally, laboratory personnel did not fabricate cylinders outside the laboratory; therefore, written procedures were not available for documenting the transfer of test specimens from the field to the laboratory

(b) Quality Assurance: Written procedures for handling deficient testing procedures were not available in the laboratory as required in Section 10.1.4 of C1077.

Curing Facilities (C511-09):

(c) The temperature of the moist storage air and the temperature of the storage water tanks were observed at intervals on October 24, 2014 and found to be as follows:

Time:	Moist Storage Air:	Water Storage #1:	Water Storage #2:
9:00 a.m.	19.9°C	19.7°C	19.8°C
12:00 p.m.	20.1°C	19.7°C	19.7°C
3:30 p.m.	20.8°C	19.6°C	19.6°C

The range specified in C511 is 21.0 to 25.0°C.

Specimen Shipping Containers (C31-12):

(d) **Informational Footnote:** It was understood that, normally, laboratory personnel did not fabricate cylinders outside the laboratory; therefore, containers for transporting cylinders from the field to the laboratory were not maintained.

Procedures:

(e) Slump of Concrete (C143-12): The time utilized in lifting the slump cone was less than the three second minimum specified in Section 7.3 of C143.

(f) Unit Weight of Concrete (C138-13): During the filling operation the container was not tapped after the first layer was rodded as required in Section 6.3 of C138.

(g) Air Content (Volumetric Method) (C173-12): During the filling operation the container was not tapped after the second layer was rodded as required in Section 7.1 of C173.

(h) Air Content (Pressure Method) (C231-10): It was understood that the aggregate correction factor was added to the apparent air content, rather than subtracted as required in Section 9.1 of C231.

Additional Test Methods:

(i) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete (C42-13): With reference to measuring the length of a concrete core, which is required for this test, attention is invited to footnote (k).

(j) Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading) (C78-10): With reference to the water storage tanks, which are required for this test, attention is invited to footnote (c).

(k) Measuring Thickness of Concrete Elements Using Drilled Concrete Cores (C174-13): It was understood that verification gauges, as prescribed in Section 3.7 of C174, were not available in the laboratory as required.

(l) Making and Curing Concrete Test Specimens in the Laboratory (C192-13): Prior to starting rotation of the mixer, coarse and fine aggregate were added together, rather than adding the coarse aggregate and some of the mixing water as required in Section 7.1.2 of C192.

CLOSURE

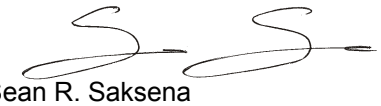
This inspection was performed by Will Mihlmester and Sean Saksena. While the work was in progress, many of the details covered by this report were discussed with laboratory personnel. At the conclusion of the inspection the special work sheets, on which all observations were recorded, were made available for review by members of the laboratory staff, and all of the entries thereon were discussed in detail.

Identification of the testing equipment used by the CCRL inspector during the inspection can be found on the CCRL website at www.ccrl.us under the heading of traceability.

It is recommended that this report be compared with the report of the preceding inspection which was made in September 2012. For further reference the CCRL laboratory number is 35.

This report does not approve, certify or accredit this laboratory. Publicizing the inspection without full disclosure of this report is not permitted.

Cement and Concrete Reference Laboratory



Sean R. Saksena
Inspector

Report Approved By: