Technical Committee & Subcommittees
Technical Committee
2014 & 2015 Chair, Rick Wheeler, CEMEX

The mission of the CRMCA Technical Committee is to continuously improve the basic and innovative concrete technologies in Colorado. The objectives are to provide oversight and guidance in the areas of education and research, technical support and specifications, ACI and other industry related certifications, partnership with CDOT and to assist other committees or groups to accomplish objectives for the betterment of the Colorado ready mix industry.
Technical Committee Key Areas

Certifications/ACI
Assist with support and enhancement of ACI Certification offerings and training.

CDOT Partnership
Interact with CDOT to ensure strong working relationship and common initiatives like training, specifications and testing procedures.

Education & Research
Provide a leadership role in educating the Colorado ready mix concrete industry on common and agreed upon technical issues.

Technical Support and Specifications
Work with agencies and engineering firms to improve/modify specifications, and provide technical support to the ready-mixed concrete industry.
Certifications/ACI
Assist with support and enhancement of ACI Certification offerings and training.
Certification Program Subcommittee
Chair, TBD

2014 Accomplishments

• ACI Program – Administered over 1300 examinations with 51 sessions in Denver, Colorado Springs, Grand Junction, Durango, and Silverthorne

• Establish partnership with ASTM Online Learning modules for Field 1, Strength, and Aggregate Testing

2015 Goals

• Continue with successful program and offering certification sessions around the state.

• Increase training resources through the use of online and training sessions
2014 ACI Overview

- 51 Certification Testing sessions (includes all documented ACI Sessions)
- 769 Testers (719 in 2013)
- 1313 Exams total (Written and Performance) (1289 in 2013)
  - Field 1
    - 2014 Average Pass Rate 72%
    - 2013 Average Pass Rate 80%

Locations
- Colorado Springs
- Denver
- Durango
- Grand Junction
- Silverthorne
2014 ACI Contributors

Key Individuals
Tammy Buck – Head Proctor and CDOT
Rod McMahon - CDOT
Ron Buck, Certified Examiner – Denver & Co Springs
Michael Berry, Certified Examiner – Western Slope
Rick Wheeler, CEMEX – Instructor

Donation of Concrete
Ready Mixed Concrete – Denver
Transit Mix – Colorado Springs
Grand Junction Ready Mix – Western Slope
United Companies - Western Slope
Everist Materials – Western Slope

Facility Contributors
CDOT – Denver, Durango & Grand Junction
Everist Materials - Silverthorne
Transit Mix Concrete – Colorado Springs
## 2014 ACI Contributors - Proctors

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Company Name</th>
<th>Company Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG Wassenaar</td>
<td>Grand Junction Ready Mix</td>
<td>U.S Bureau of Reclamation</td>
</tr>
<tr>
<td>BASF</td>
<td>Ground Engineering</td>
<td>Whitewater Building Materials</td>
</tr>
<tr>
<td>Bestway Concrete Company</td>
<td>Holcim (US), Inc</td>
<td>Yeh &amp; Associates</td>
</tr>
<tr>
<td>CDOT (Multiple Regions)</td>
<td>Jacobs Engineering</td>
<td></td>
</tr>
<tr>
<td>CEMEX</td>
<td>Kleinfelder</td>
<td></td>
</tr>
<tr>
<td>Cesare, Inc.</td>
<td>Kumar &amp; Associates</td>
<td></td>
</tr>
<tr>
<td>City of Aurora</td>
<td>Metro Mix</td>
<td></td>
</tr>
<tr>
<td>CTL Thompson</td>
<td>Grand Junction Ready Mix</td>
<td></td>
</tr>
<tr>
<td>Federal Highway Administration</td>
<td>Rocksol Consulting Group</td>
<td></td>
</tr>
<tr>
<td>(FHWA)</td>
<td>Transit Mix</td>
<td></td>
</tr>
<tr>
<td>GeoCal</td>
<td>Trans- Colorado Concrete</td>
<td></td>
</tr>
<tr>
<td>GCC of America</td>
<td>United Companies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Certification Online Learning through ASTM

Field Testing, Strength, and Aggregate Testing

**Training Modules Include:**
- Self-guided slide presentation covering essential content from the ASTM standard
- Hands-on video demonstrations by experts
- Step-by-step outlines of procedure
- Glossary of essential terms
- Self-guided review quiz with automatic grading

**Additional Features:**
- Quiz questions are similar in format and difficulty to those on national certification exams
- Modules can be grouped together in any combination
- Your content can be added to any module to create a tailored training product
Time Line – ASTM Online learning

- January to April 2014 – CRMCA continues to evaluate online learning platforms through multiple sources
- April 2014 – CRMCA decides to move forward with ASTM
- May 2014 – CRMCA begins discussions on partnership with ASTM
- June 2014 – ASTM develops and builds unique pricing and registration page for CRMCA membership
- July 2014 CRMCA begins marketing ASTM online training courses – Members receive Discount
- September 2014 ASTM and ACI co-branding online training courses
- November 2014 – **ASTM offers CRMCA Members 70% discount until December 31, 2014**
2015 ACI Overview

• 2015 Schedule Posted and available for registrations. No increase in prices
  • Locations will be Colorado Springs, Denver, Durango, Grand Junction, and Silverthorne

• Examiner of Record 2015
  • New Examiner of Record for primary Denver and Colorado Springs Sessions
    • John Durkin, Cesare, Inc.
    • Erin Arndt, Cesare, Inc.
    • James Mesite, Cesare, Inc.
  • Specialty Certifications – Ron Buck, CDOT
    • ACI Concrete Construction Special Inspector, Concrete Transportation Inspector, and Flatwork
  • Western Slope – Michael Berry, Huddleston & Berry

• Additional Training and Resources
  • Live Classes – Field 1
  • ASTM/ACI Online Training Modules
  • Adding Review Sessions prior to Certification Session
ACI/Certification Program Q & A
CDOT-CRMCA Partnership
Interact with CDOT to ensure strong working relationship and common initiatives like training, specifications and testing procedures.
CDOT – CRMCA Partnership Subcommittee

2014 & 2015 Chair, Brandon Joy, CDOT

2014 Accomplishments

• 2 CDOT-CRMCA Concrete Pavement Certifications – 90 attendees
• Specification Changes based on feedback from participants in subcommittee
• Build stronger communication lines around the state by:
  • Holding meetings in Denver, Silverthorne, and Colorado Springs and provided updates since 2011 “green” book came out
  • Providing information to be distributed to membership on upcoming changes

2015 Goals

• 2 CDOT-CRMCA Concrete Pavement Certifications
• Hold a meeting in each of the regions
• Continue to send/receive information/feedback in relation to CDOT Specifications, technology, and standards.
Spec Changes - Concrete QC Requirements

• QC Requirement for Structural Concrete
  • Specifications did not explicitly state who was responsible.
  • CDOT changed specification to re-emphasize the Contractor is responsible for QC

• Air Meter Check Testing
  • There were previous issues with QA vs QC readings on air content
  • Air meters calibrations must be checked if QA and QC differ by more than 0.5%
Spec Changes - Type IL and IT Cement

- It was suggested that CDOT allow 15% limestone in cements
  - After review of ASTM C 595 the decision was made to follow 595 and allow up to 15%
  - Type IL and IT cements were added to CDOT specifications and sulfate requirements were updated for new cement types
Spec Changes - Pozzolan Changes

• CDOT now allows fly ash blending is accordance with ASTM D 5370
• More pozzolan types are now allowed to adapt to power plant and EPA changes
  • High reactivity pozzolans such as ultra fine fly ash, rice hull ash, metakaolin etc.
  • Follow AASHTO M 321
Committee Road Show

• In an effort to educate all areas in the state the committee is traveling to different locations to hold the meeting
  • Presentations are given on specification changes and upcoming changes
  • All areas in the state can participate and contribute to the Committee
Ongoing Items

• Communicating Specification Changes
  • CRMCA website will be updated with current CDOT site
  • Changes are communicated at Technical Committee Meetings
  • Announcements will be made through CRMCA

• FAQ
  • Matt McCombs is collecting FAQs that will be answered by CDOT

• Sub-Committee discussions
  • Every meeting has an open discussion section for any industry concerns or proposed changes
CDOT-CRMCA Partnership Q & A
Education & Research

Provide a leadership role in educating the Colorado ready mix concrete industry on common and agreed upon technical issues.
Education and Research 2014
2014 Chair, Curtt Coppage

2014 Accomplishments
• Created standardized templates and processes for presenters for educational seminars.
• Statewide Tests Fests – Total of 65 Participants
  • Grand Junction (Cold Weather)
  • Colorado Springs (Hot Weather)
  • Denver (Hot Weather)

2015 Goals
• Create CRMCA “Position Statements” as required
• Continue Tests Fests around the state and collecting data
Test Fest Overview
Kevin Kane, Holcim (US), Inc.

• Participants from ready mixed concrete producers, testing agencies, and State/municipal testing agencies all test a sample from the same load of concrete.

• Participants each sample the load of concrete by lining up with wheelbarrows and sequentially taking two passes under the chute of a ready mix truck, thereby assuring that each sample is obtained the same way and are similar.

• Each participant is then responsible for testing their sample for slump, air content, density, and temperature, and then casting a set of five 4 x 8 cylinders for testing at 7 & 28 days.

• The CCRL (cement and concrete reference laboratory) Z-Scores and Z-Score Ratings are calculated for slump, air content, density, temperature, and 7 & 28 day compressive strength. Results are submitted anonymously, and the data is distributed for each participant to compare his/her results to the field of results.

• In addition, experiments performed to test effects of commonly observed testing standard deviations
Participating Companies Statewide

Aggregate Industries
AG Wassenaar
BASF
Bestway Concrete
CDOT
City of Aurora
City of Grand Junction
CRE Design Engineering
CTL Thompson
Entech Engineering
Everist Materials
Grand Junction Ready Mix
Grand Junction Lincoln Development
Ground Engineering
HBET
Holcim (US), Inc.

Huddleston Berry & Associates
Kumar and Associates
Martin Marietta Materials
Martinez and Associates
Metro Mix
North American Testing
Pete Lien & Sons dba Trans-Colorado Concrete
PSI
Rocky Mountain Pre-Mix
Transit Mix
United Companies
Vine Laboratories
Whitewater Building Materials
Western Slope Test Fest
January 16, 2014
Western Slope Test Fest
January 16, 2014
Effect of Initial Curing on Strength Development

- **Compressive strength, psi**
  - **7 day psi**
  - **28 day psi**

- **Insulated Cooler**
- **Outside, ambient air**

- **Compressive strength values:**
  - Insulated Cooler: 3500 psi (7 day) and 5000 psi (28 day)
  - Outside, ambient air: 1500 psi (7 day) and 2500 psi (28 day)
Southern Test Fest
June 9, 2014
Central Test Fest
August 4, 2014
Feedback from testing agencies

- Jennifer Martinez / Martinez Associates
- Kyle Duitsman / PSI
- Josh St. Onge / Ground Engineering
- Scott Hougard / Kumar & Associates
- Tom Hastings / Wassenaar
- Tom Pieters / City of Aurora
- Amy Norwood / Vine Laboratories
- Greg Perzinski / Geocal
- Arthur Reed / CTC Geotec
- Andy Rosedahl / CDOT
- Mark Coppeak / CTL Thompson
Summary of Results

• Technician assessments have proven to be a useful exercise for laboratories and technicians to compare their test results to others.

• Technician assessments and *experiments* provide the CRMCA with data needed to educate engineers and contractors.
  • Importance of ACI 301-10 1.6 check-tests
  • Importance of proper initial curing

• Results of experiments guide our actions and responses to commonly observed deviations.
  • Initial curing
  • Late moving of cylinders
  • Late de-molding of cylinders
2015 Goals

• Create CRMCA “Position Statements” as required
• Continue to collect and share data around the state
• Leverage the data through ‘Lunch and Learn’ for engineers and contractors
• Increase participation by:
  • Educational Lunch and Learns prior to each Test Fest
    • Share results with those that participate
    • Encourage others to attend to learn more about and participate in upcoming seminar
December 10, 2014
CRMCA – 2nd Floor Training Room
Centennial, CO

Handling Concrete Specifications, Low Strength Problems and Mixture Submittals
December 10, 2014, Denver, CO

Luke M Snell, PE, FACI, FASCE
Senior Materials Engineer at Western Technologies

Karthik Obla, Ph.D., P.E., FACI
Vice-President, Technical Services at NRMCA
Education & Research Q & A
Technical Support and Specifications
Work with agencies and engineering firms to improve/modify specifications, and provide technical support to the ready-mixed concrete industry.
Technical and Specifications Subcommittee
2014 & 2015 Chair, Rick Wheeler, CEMEX

2014 Accomplishments
• Executed TC-01 Pre-Construction Checklist and provided support for:
  • Training through webinars for individuals to use document
  • “Training the Trainers” webinar for statewide market committee members to present at “Lunch and Learns”
• “Adherence to Standards” program in final development stages.

2015 Goals
• Yearly update to the TC-01 Pre-Con Checklist
• Continue with Adherence to Standards Program
• Begin working with request from Municipalities to have a more standard specification.
TC-01 Preconstruction Checklist

- Key to a Successful Construction Project
  - Meet to discuss critical aspects of the project
  - Concrete mixtures - usage and expectations
  - Concrete delivery and placements
  - Concrete performance and testing
Adherence to Standards
Overview

• Goal: Fair and Consistent Assessment of Ready Mixed Concrete
• ASTM and ACI have established standards and guidelines to evaluate the performance of concrete
  • RM Producer’s Role
  • Contractor’s Role
  • Project Owner’s Role
  • Testing Laboratory’s Role
Adherence to Standards
Sample Form – Simple and Easy to Use

<table>
<thead>
<tr>
<th><strong>Date of Observation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>14-11-2014</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Laboratory Name</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annelise's Lab</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Assessor Company</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Todd's Concrete Co.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Tester First Name</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anne</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Assessor Name</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Todd Olheiser</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Approximate Time of Sampling</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>05:30 AM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Jobsite Location</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado Springs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Jobsite Name</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Tester Last Name</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shop</td>
</tr>
</tbody>
</table>

Please enter NA if the information is not available

**ASTM Adherence**

1. The concrete supplier will be responsible for compliance when samples are obtained at truck discharge after 10% or before 90% of the batch has been discharged and tests are conducted in accordance with applicable ASTM standards.

   - Yes
   - No
   - Did not observe

**Explain No**

The tester conducted the tests before 10% of the batch had been discharged.

2. ASTM C172, section 4.1.1 states, “Transport the individual samples to the place where fresh concrete tests are to be performed or where test specimens are to be molded.” Section 4.1.2 states, “Start tests for slump, temperature and air content within 5 min. after obtaining the final portion of the composite sample.”

   - Yes
   - No
   - Did not observe

3. ASTM C94, section 7.2 states, “the producer shall not be responsible for the limitation of minimum slump or slump flow after 30 min. have elapsed starting either on arrival of the vehicle at the prescribed destination or at the requested delivery time, whichever is later.”

   - Yes
   - No
   - Did not observe
Adherence to Standards

Sample Question Format and Comment Section

5. ASTM C31 states, "Immediately after molding and finishing, the specimens shall be stored for a period up to 48h in a temperature range from 60 and 80 F and in an environment preventing moisture loss from the specimens. For concrete mixtures with a specified strength of 6000 psi or greater, the initial curing temperature shall be between 68 and 78 F." ASTM C31 also states, "The storage temperature shall be controlled by use of heating and cooling devices, as necessary. Record the temperature using a maximum-minimum thermometer."

- Yes  - No  - Did not observe

6. ASTM C31 states, "Upon completion of initial curing and within 30 min after removing the molds, cure specimens with free water maintained on their surfaces at all times at a temperature of 73.5 +/- 3.5 F"

- Yes  - No  - Did not observe

7. ASTM C31, Section 11.1 states, "Specimens shall not be transported until at least 8 h after final set. During transporting, protect the specimens with suitable cushioning material to prevent damage from jarring. During cold weather, protect the specimens from freezing with suitable insulation material. Prevent moisture loss during transportation by wrapping the specimens in plastic, wet burlap, by surrounding them with wet sand, or tight fitting plastic caps on plastic molds. Transportation time shall not exceed 4 h."

- Yes  - No  - Did not observe

**Summary Comments**: Overall the tester adhered to most ASTM standards.
Adherence to Standards Program
Sample Listing Format

<table>
<thead>
<tr>
<th>My Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sort By: Lab Name Ascending</td>
</tr>
<tr>
<td>Annelise's Lab</td>
</tr>
<tr>
<td>🎉 8</td>
</tr>
<tr>
<td>CRMCA</td>
</tr>
<tr>
<td>🎉 8</td>
</tr>
</tbody>
</table>
Adherence to Standards - Sample Detail View
Technical & Specification Q & A
Technical Committee Summary & 2015 Goals

- Continue being an advisory board to review and disseminate necessary tasks/requests from membership and the industry to the associated subcommittee(s).

- To provide guidance and support to the goals and objectives of each of the sub-committees.
Technical Committee Q & A