
CONCRETE TESTING
ADHERENCE
COLLABORATION
CTAC
WWW.CONCRETETAC.COM
We will
begin shortly...
THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE
aci CONCRETE
CONVENTION

About Me

Graduated
Univ. of Wyoming
in 2001

Civil Engineering
(Geotech discipline)

Received
Professional Engineer
(P.E.)
in 2006

Career includes
construction materials
testing,
pavement/foundation
design,
inspection/forensics

Employed with
CTL|Thompson,
Geocal,
and Cesare
in Colorado

~~*Enslaved*~~
PROUDLY working
with the CRMCA
since 2016


DEFRA-CURE

Project Expectations

Technicians ***must*** be certified

Technicians ***must*** know procedures

Technicians ***should*** know WHY testing is needed and meaning of tests

Managers ***should*** know who tests correctly and consistently

Managers ***should*** know if training is working

Producers ***should*** know their results are not due to "poor" testing

Owners ***must*** feel at ease with testing and results

What requirements and standards should be followed?

Quality Assurance vs. Quality Control

Quality Control (QC)

- More frequent than QA
- Verify consistency with plant

Quality Assurance (QA)

- Project Specification verification
- Approval for acceptance

Field testing requirements for both QA and QC are identical

Field Testing Requirements

Concrete Sampling

- Water/Admixtures mixed before sampling
- Sample from chute
  - Multiple times
  - Equal intervals
  - Middle portion
- Combine and remix samples

- ***ASTM C172***

Concrete Testing

- **Temperature *(ASTM C1064)***
  - Completely in the sample
  - Leave in 2-5 mins then record
- **Slump *(ASTM C143)***
  - Flat, level, non-absorbent surface
  - Strike-off and clear base of excess
  - Lift cone in ~5 secs
  - Complete in 2-1/2 mins
- **Density & Air Content (Pressure) *(ASTM C138 & C231)***
  - Weighing before/after
  - Three (3) lifts
  - Strike off with plate if both tests performed
- **Casting Specimens *(ASTM C31)***
  - Started within 15 mins of sampling
  - Strike-off, clean and label
  - Immediately place in Initial Curing area

- **All Procedures require:**
  - Rodding 25 times; 10-15 mallets per lift
  - Rodding 1-in into prev. lift

Initial Curing

- Near testing area
- Away from excessive construction traffic
- Enclosed are or buried
- Submerged in water or covered with insulation
- Temperature controlled or monitored

- ***ASTM C31***

MINUTES OF NOVEMBER 13 & 14 MEETINGS AS PER ENCLOSED COPY

HIGHWAY DEPARTMENT SPECIFICATIONS PROBLEMS

Plans are in the making - and probably will be activated before the December Board meeting - to determine our industry's position, also that of the Colo.Sand & Gravel Producers Association, on recent difficulties with the Colo. Department of Highways in their exacting penalties on producers for in-place concrete purported to be outside of tolerances - with possible inconsistencies in sampling and testing procedures. Representatives of both Associations will meet prior to the Board meeting, and possibly will come up with a recommended plan of action for the Board's decision.

COLORADO
READY MIXED CONCRETE ASSOCIATION

181 East 56 Avenue, Denver, Colorado 80216 Phone Area 303-244-338

December 2, 1970

TO: CRMCA BOARD OF DIRECTORS

Gentlemen:

The December meeting of the CRMCA Board of Directors is scheduld on Wednesday, December 16, 1970, in the Continental Denver Motor Hotel (Speer Blvd. (north) & Valley Highway) Australia Room, at 12 Noon.

This will be a dutch treat luncheon meeting, and a luncheon reservation will be made for each Board member.

61-973

A G E N D A

ROLL CALL

Not Just in Colorado… **NRMCA Survey from 1997*

	List of 15 Highest Rated Problems
1	**Quality Assurance** - Improper handling and curing of cylinders
2	**Quality Assurance** - Tests of fresh concrete at the job
3	**Mixing & Delivery** - Control of air content
4	**Quality Assurance** - Lack of qualified testing technicians
5	**Proportioning** - Quality and uniformity of local materials
6	**Proportioning** - Selection of optimum proportions (cement, fly ash, admixtures)
7	**Mixing & Delivery** - Control of slump
8	**Records of Test Results** - Obtaining test results for commercial labs/agencies
9	**Specification Problems** - Conflicting w/c ratio - performance requirements
10	**Raw Materials Variability** - Aggregates
11	**Quality Assurance** - Compressive strength testing
12	**Raw Materials Variability** - Lack of communication from suppliers on changes in product
13	**Raw Materials Variability** - Cement
14	**Customer Complaints - Plastic Concrete** - Plastic shrinkage cracking / crusting
15	**Specification Problems** - Unreasonable performance requirements

A Tool Developed to Improve an Industry

- What tool could help the industry?
- How can the tool help the industry?
- Will it work to improve the industry?


TARGET
SPEED


XTL ERR
RFI
LO VOLT
HOLD
42
TARGET SPEED
PWR
PWR/VOL
LAMP TEST
MIN
MAX
TEST


SPEED LIMIT
25
YOUR SPEED
42

CONCRETE TESTING ADHERENCE COLLABORATION

CTAC®

Addressing Challenges in Quality of Field Acceptance Concrete Testing

Presented by JT Mesite, P.E.
Program Manager
Colorado Ready Mixed Concrete Association

Colorado Ready Mixed Concrete Association

NRMCA National Ready Mixed Concrete Association

Adherence to Standards

Goal of the CTAC Program:

Fair and Consistent Assessment of Ready Mixed Concrete

ASTM and ACI established standards and guidelines to evaluate the performance of concrete

A Tool for More Consistent Concrete Testing

Minimize false test results	*Validation of proper testing during performance on-site (including limiting false positive AND negative testing)*
Field observations	*Mobile app utilized to submit observation*
Simple & direct questions	*Standard requirements for technician certification, sampling, testing, and initial curing*
Review on-line dashboard	*Centralized and secure data collection and access for observation tracking and evaluation*

A Tool for More Consistent Concrete Testing

Improve performance	*Evaluation and interpretation reported information of company and individuals leading to consistent testing*
Team communication	*Open and honest conversations bringing the project team together*
Market the company	*Show superior company performance in project proposal documentation*
Educate regionally	*Review of regional data to provide better and clearer training opportunities*

Benefits to CTAC Users

Testing Firm
- Technician competency
- Training enhancement
- Meeting Standards

Producer
- Consistency in concrete results
- QC accuracy

Contractor
- Project testing tracking
- Testing efficiency
- Limit delays/cost

Design Engineer
- Testing evaluation
- Result confidence

Owner
- On-time project completion
- QC/QA comparisons

Observations in the Field

NOT a "*Finger Pointing*" device!

- Drives accountability
- Provides Training initiatives
- Security in reliable results
- Shared responsibility

Record through mobile app

- On-site Observations
- Input by experienced ACI Certified individuals
- QA, QC, Inspector, Contractor, Engineer, Owner Rep

Current Main Questions

ACI CERTIFIED…?

Is the testing technician currently ACI Field 1 certified to test concrete?

SAMPLED CORRECTLY…?

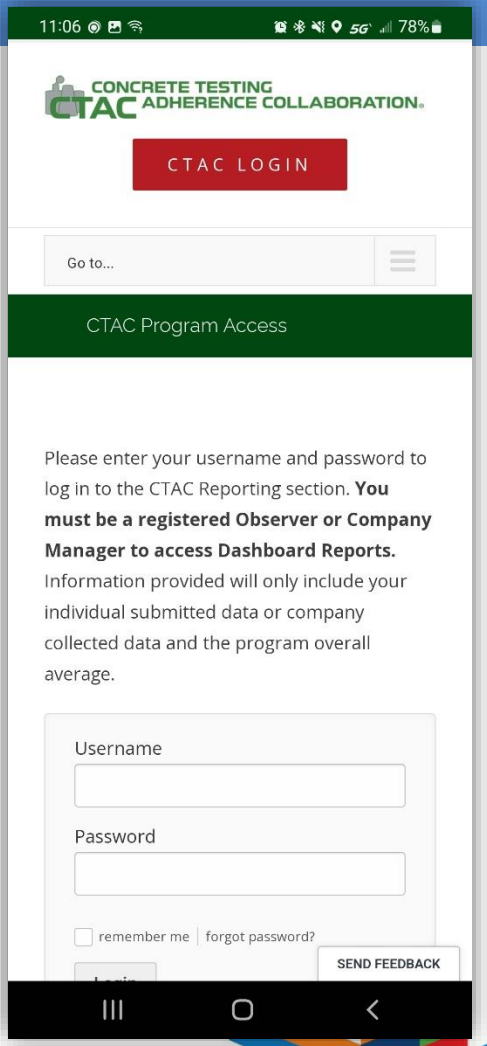
Excluding preliminary check tests, was the concrete sampled in accordance with ASTM C172?

TESTS DONE CORRECTLY…?

Where physical property tests completed and strength specimens molded (if required for cast) in accordance with the appropriate ASTM procedures?

SPECIMENS PROPERLY CURING…?

Were the concrete specimens (if required to cast) stored in an initial curing environment following ASTM C31, section 10.1.2?




5:02
66%
ASTM Adherence
1 2 3 4 5
3. Physical Property Tests of Concrete
During testing of the concrete, were any of the following procedures completed incorrectly?
Temperature ASTM C1064
Slump ASTM C143
Air Content ASTM C231 or ASTM C173
Density (unit weight) ASTM C138
Casting concrete strength specimens ASTM C31
Tests completed within time requirement ASTM C172, section 4.1.2
The concrete was tested correctly for all procedures
Image/Video Upload (Optional):
Choose File No file chosen
Image/Video Upload (Optional):
Choose File No file chosen
Were physical property tests completed and strength specimens molded (if required to cast) in accordance with the appropriate ASTM procedure?
Yes
No
« Back
Next »
SEND FEEDBACK

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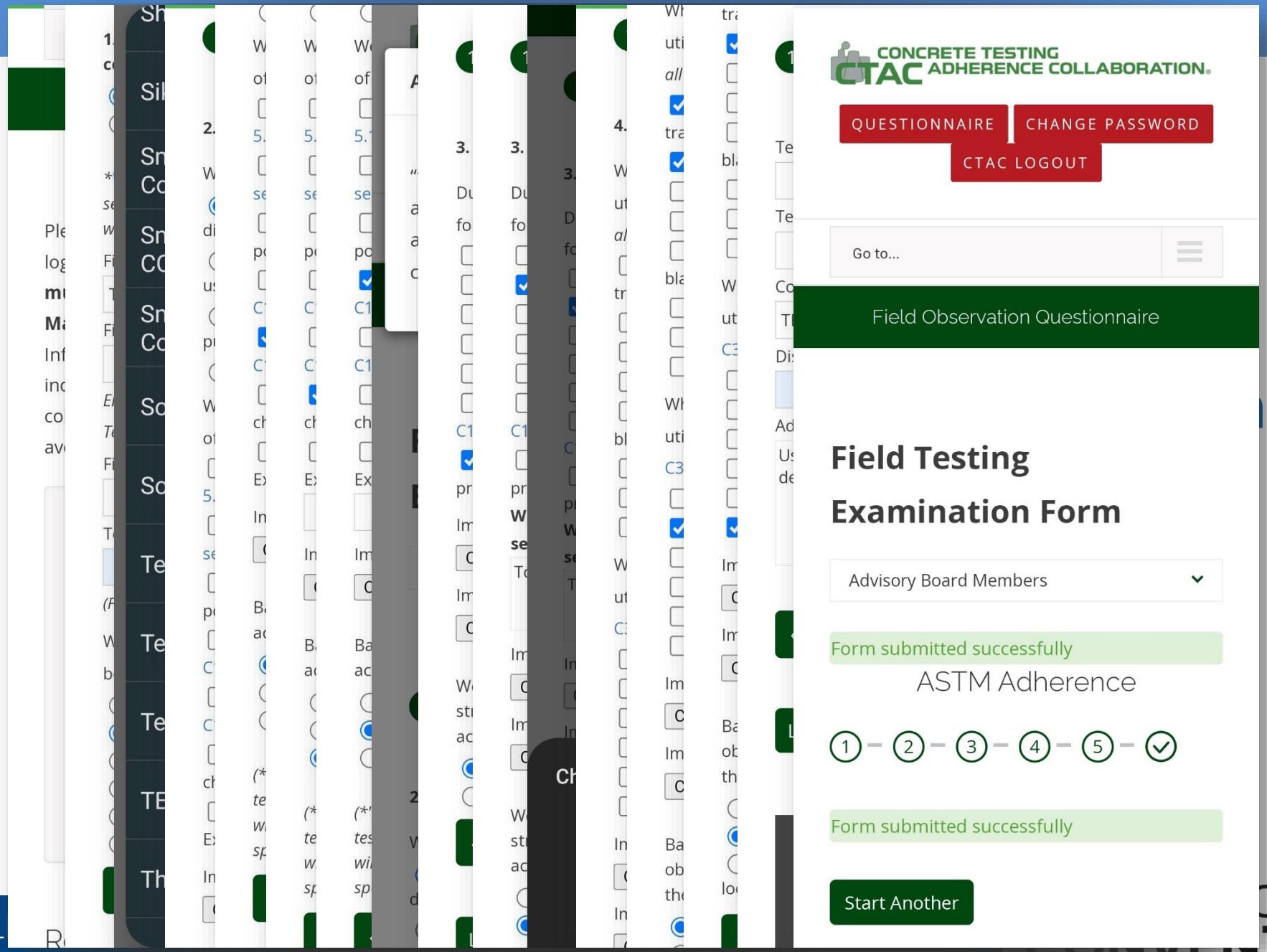
the App




Where Does the Data Go?

CTAC Report Privacy

CTAC Log-in

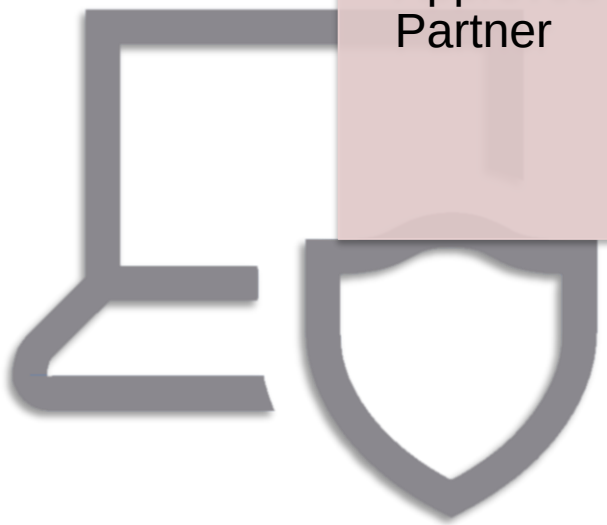
- User specific
- Approved by Partner

Dashboard Data

- Only see your data
- Based on authorization (Observer, Company Manager, etc.)

Company Review

- Comparison vs. regional average
- Marketing



rtner Manager, CRMCA

Report Filter Options

Select Company:

All

All

Select Type:

Observer

Observer

Select Observer:

All

All (observers)

Select Property/Site Type:

All

All

Save current search:

Search Label/Name:

Name of Saved Search

Save Search

- **BURNCO 2022**: view | view short report | delete
- **Terracon-Lab 2022**: view | view short report | delete
- **CRMCA Thru Sept23**: view | view short report | delete

Select Date Range:

Select preset:

(selected date range)

Start Date:

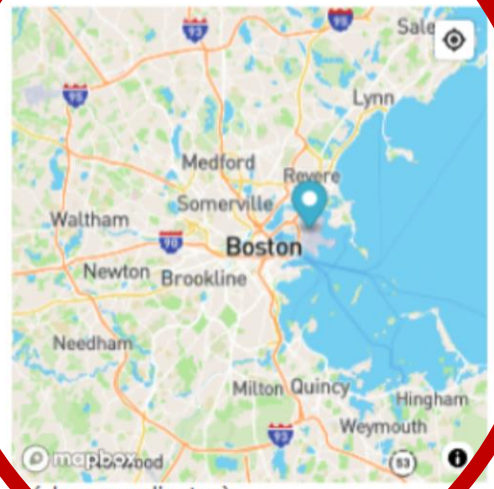
11/01/2020

End Date:

10/24/2023

11/01/2020 TO **10/24/20 3**

Update



(clear coordinates)

La tude:

42.370162

Radius (mi

Longitude:

-71.01409265:

Dashboard Overview | Evaluation | Laboratory | Observations | Observation Images

Dashboard Overview | **Evaluation** | Laboratory | Observations | Observation Images

Question	Last Year	Current Year	Current Selection
Technician Certified?			
1 Is the testing technician currently ACI Field 1 certified to test concrete	88.8%	81%	88.8%
Sampled In Accordance with ASTM C172?			
2 Excluding preliminary check tests, was the concrete samples in accordance with ASTM C172?	76.2%	69%	75.4%
Tested In Accordance With ASTM Procedure?			
3 Were physical property tests completed and strength specimens molded (if required to cast) in accordance with the appropriate ASTM procedure?	77.9%	90.5%	80.8%
Stored According To ASTM C31?			
4 Were the concrete specimens (if required to cast) stored in an initial curing environment following ASTM C31, section 10.1.2?	48.9%	16.7%	51.6%

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Dashboard Overview | Evaluation | Laboratory | Observations | Observation Images

	Question	Kumar & Associates	Other Companies	Variance
Technician Certified?				
1	Is the testing technician currently ACI Field 1 certified to test concrete	91.6%	87.7%	3.9%
Sampled In Accordance with ASTM C172?				
2	Excluding preliminary check tests, was the concrete samples in accordance with ASTM C172?	81.1%	73.3%	7.8%
Tested In Accordance With ASTM Procedure?				
3	Were physical property tests completed and strength specimens molded (if required to cast) in accordance with the appropriate ASTM procedure?	84%	77.3%	6.7%
Stored According To ASTM C31?				
4	Were the concrete specimens (if required to cast) stored in an initial curing environment following ASTM C31, section 10.1.2?	64%	47%	17%

Users

Search:

Username	First Name	Last Name	Company	User Type	Last Login	Last Observation	Create
agarner	Andrew	Garner	Cole Garner (PCH Group)	Company Manager	11/21/2022		2022-11-16 07:48:05
agwassenaar	Kourtney	[illegible]	A.G. Wassenaar, Inc.	Observer			2014-11-25 22:45:24
ahilpisch	Alexander	Hilpisch	BURNCO Colorado, LLC	Observer	10/5/2023	2023-10-03	2023-06-08 16:24:34
aichiouene	Mustapha	Aichiouene	Yeh & Associates, Inc.	Observer	1/20/2021		2014-10-02 21:35:05
Ajmid2n	Andrew	Midthun	Peak Materials (L.G. Everist)	Observer	10/4/2023		2019-07-22 16:47:43

Showing 1 to 5 of 142 entries

Previous 1 2 3 4 5 ... 29 Next

Observers

Search:

Observer	Total	Past 3 Months	Q1	Q2	Q3	Q4	Air Content	Casting Strength	Density (Unit Weight)	Slump	Temper
	1	0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Alexander Hilpisch	29	19	100.0	0.0	82.8	0.0	100.0	100.0		82.8	
Anthony J Maestas	2	0	100.0	50.0	100.0	50.0	100.0	100.0	100.0	[illegible]	
Blair Noyes	119	0	99.2	100.0	100.0	99.2	100.0	100.0	100.0	100.0	
Braden Johnson	3	0	100.0	100.0	100.0	100.0	100.0	100.0	[illegible]	100.0	

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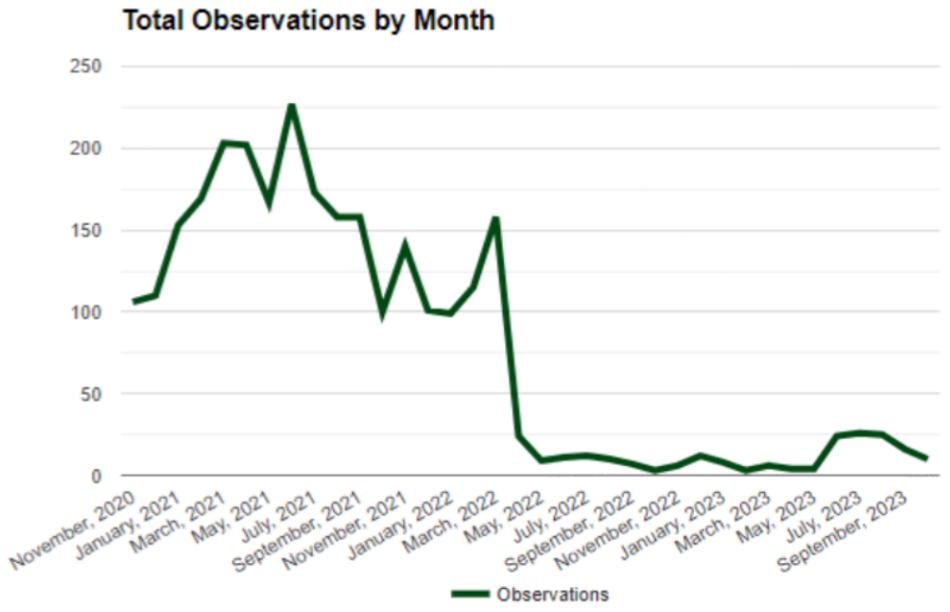
Previous 1 2 3 4 5 Next



Type Of Project/Site

What type of Project/site is concrete testing observed	Last Year	Current Year	Current Selection
Commercial/Industrial	70%	36%	61%
Federal/State	10%	10%	9.1%
Local/Municipality	10%	10%	9.1%
Other	0%	4%	0.3%
Private	1%	21%	1.7%
Residential	6%	18%	9.9%

Sample Collection

Where was the sample(s) collected from?	Last Year	Current Year	Current Selection
At end of mixer truck discharge; prior to pump/belt (if used)	56%	15%	53.2%
At point of placement, end of mixer truck discharge	39%	79%	41.2%
At point of placement; end of pump/belt (if used)	4%	3%	4.6%
Other	2%	2%	1.1%

Observed Sampling

Which of the following was observed?	Last Year	Current Year	Current Selection
Did not combine and remix	8%	20%	11.6%
Exceeding sample time allowance	0%	0%	0%
Incorrect location (outside middle 1/3rd of truck dischanrge)	0%	0%	0%
Incorrect portions/interval sampled	2%	0%	1.4%
Incorrect sample size taken	0%	0%	3.9%
Other	0%	0%	0%

Procedures Observed

Which procedure was not followed?	Last Year	Current Year	Current Selection
Air Content	3%	2%	2.9%
ting Concreate strength specimens	7%	0%	3.1%
Densi	3%	3%	3.8%
Slu	17%	6%	15.1%
mperature	3%	2%	3.2%
Test completed within time requirement	2%	0%	1.5%

Initial Curing Environment

Which of the following was utilized?	Last Year	Current Year	Current Selection
Cooler or bucket (dry)	59%	64%	55.5%
Earthen burial	0%	1%	0.1%
Fabricated curing box or storage area	15%	17%	13.7%
Insulation (i.space blanket, foam, plastic shaving, etc.)	32%	2%	22.2%
Water bath	6%	18%	18.1%
Other	26%	4%	21.7%
Nothing; specimens left in open environment	4%	2%	2.1%

Temperature Monitoring or Control

Which type of temperature monitoring device was utilized in the curing environment?	Last Year	Current Year	Current Selection
Continuous record	1%	8%	1.2%
Instant read only	10%	2%	14.4%
Min/Max	43%	46%	40.4%
Thermostatic Control (cool)	4%	4%	3.6%
Thermostatic Control (heat)	11%	4%	8.8%
Nothing	33%	26%	32.6%

Dashboard Overview | Evaluation | Laboratory | **Observations** | Observation Images

ow 10 entries

Search:

D	Date	Dispatch Ticket	Observer	Observer Company	Q1	Tester Name	Tester Company	Tester ACI Certification	Project Type	Q2	Sample Collected From
2125	4/1/2022	20427093	Blair Noyes	BURNCO Colorado, LLC	Yes	0	Kumar & Associates		b. Local/Municipality	Yes	c. At end of mixer truck discharge; prior to pump/belt (
2127	4/1/2022	20427441	Jacob Carbajal	BURNCO Colorado, LLC	Yes	Wes	Kumar & Associates		c. Commercial/Industrial	Yes	a. At point of placement; end of mixer truck discharge
0713	3/31/2022	33327155	John Smith	United-Oldcastle Southwest	Yes	Justin Orgill	Kumar & Associates		Commercial/Industrial	Yes	At end of mixer truck discharge; prior to pump/belt (if u
0714	3/31/2022	33327155	John Smith	United-Oldcastle Southwest	Yes	Justin Orgill	Kumar & Associates		Commercial/Industrial	Yes	At end of mixer truck discharge; prior to pump/belt (if u
0715	3/31/2022	33327155	John Smith	United-Oldcastle Southwest	Yes	Justin Orgill	Kumar & Associates		Commercial/Industrial	Yes	At end of mixer truck discharge; prior to pump/belt (if u
0716	3/31/2022	33327155	John Smith	United-Oldcastle Southwest	Yes	Justin Orgill	Kumar & Associates		Commercial/Industrial	Yes	At end of mixer truck discharge; prior to pump/belt (if u
0717	3/31/2022	33327155	John Smith	United-Oldcastle Southwest	Yes	Justin Orgill	Kumar & Associates		Commercial/Industrial	Yes	At end of mixer truck discharge; prior to pump/belt (if u
0718	3/31/2022	33327155	John Smith	United-Oldcastle Southwest	Yes	Justin Orgill	Kumar & Associates		Commercial/Industrial	Yes	At end of mixer truck discharge; prior to pump/belt (if u
0719	3/31/2022	33327155	John Smith	United-Oldcastle Southwest	Yes	Justin Orgill	Kumar & Associates		Commercial/Industrial	Yes	At end of mixer truck discharge; prior to pump/belt (if u
0720	3/31/2022	33327155	John Smith	United-Oldcastle Southwest	Yes	Justin Orgill	Kumar & Associates		Commercial/Industrial	Yes	At end of mixer truck discharge; prior to pump/belt (if u

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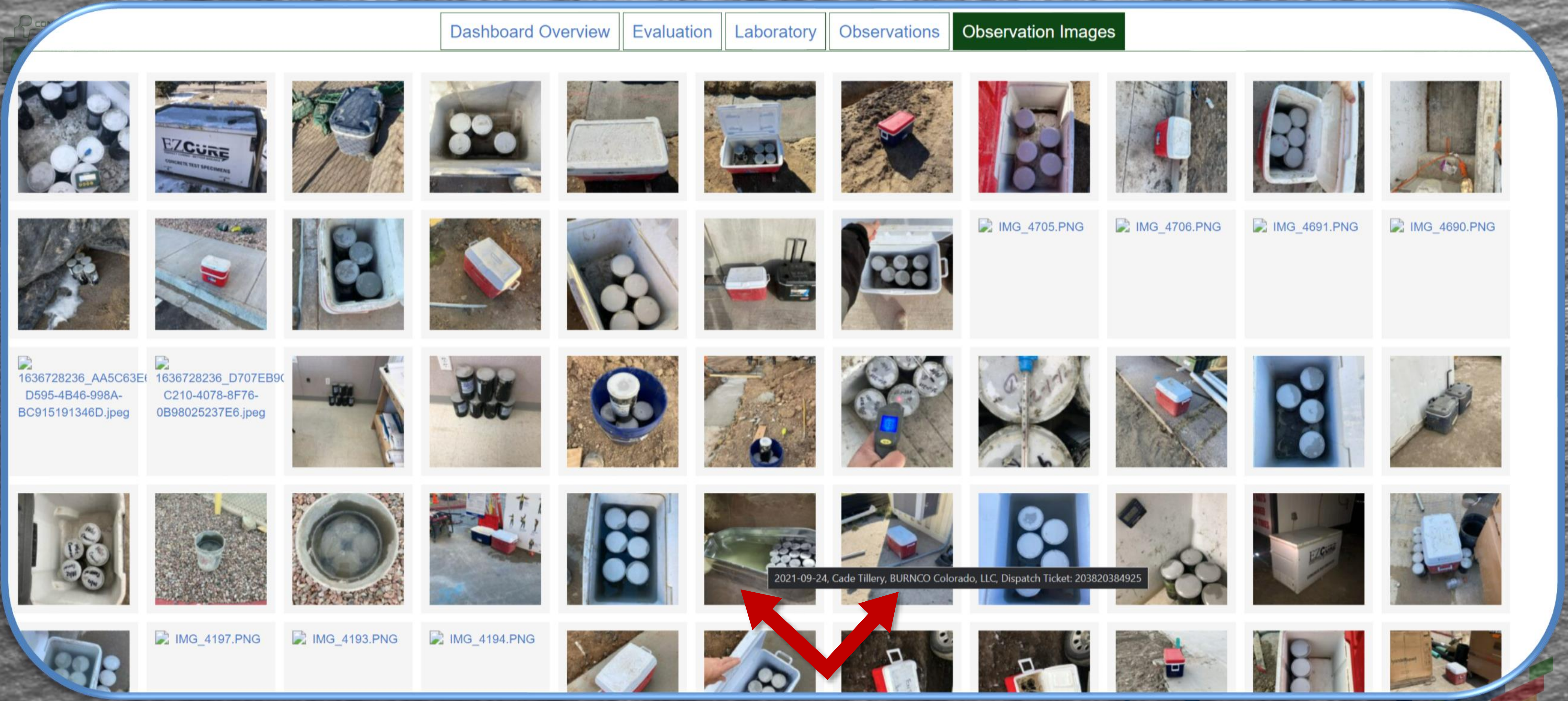
Dashboard Overview
Evaluation
Laboratory
Observations
Observation Images
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IMG_4706.PNG
IMG_4691.PNG
IMG_4690.PNG
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2021-09-24, Cade Tillery, BURNCO Colorado, LLC, Dispatch Ticket: 203820384925
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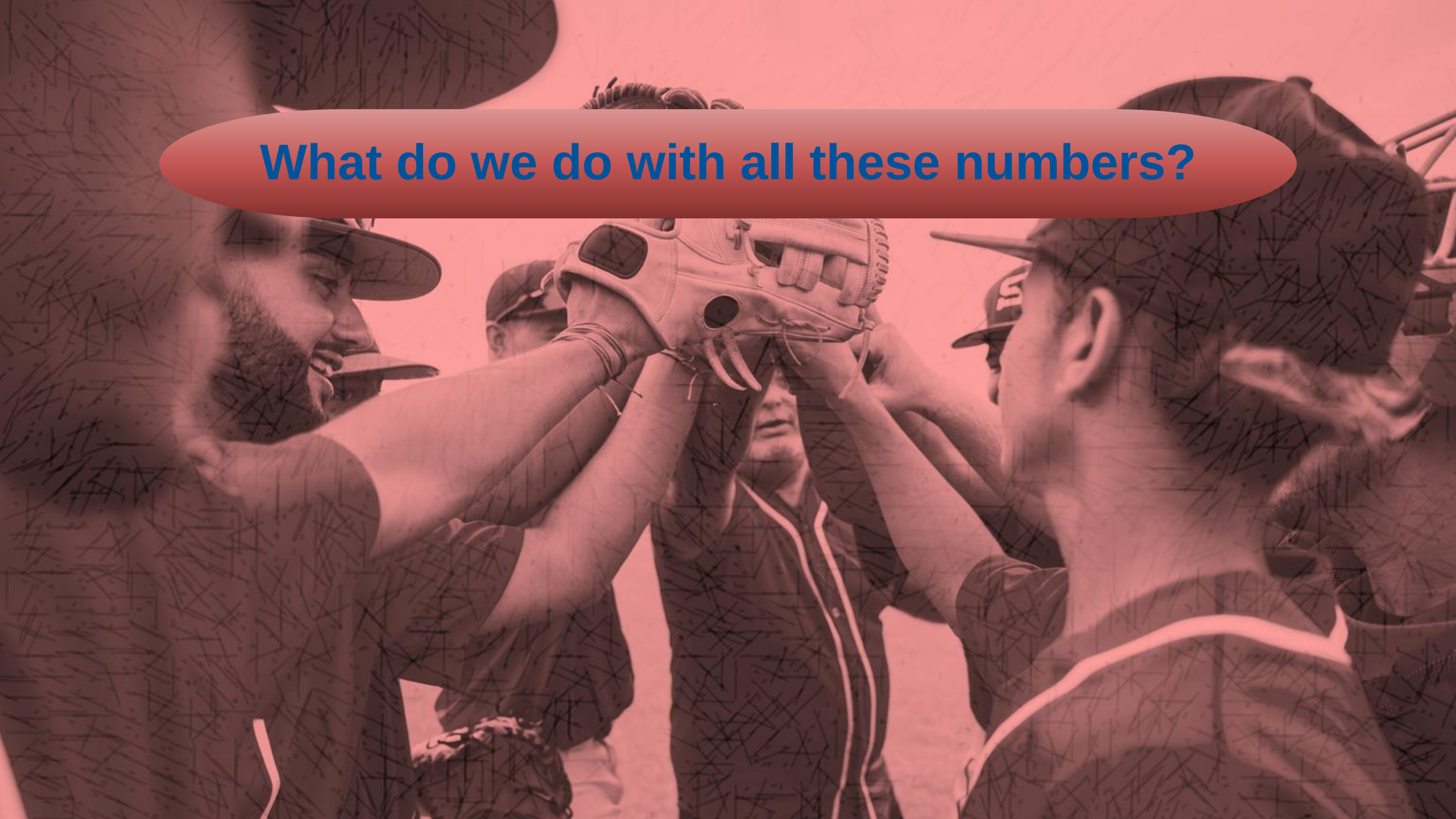
What do we do with all these numbers?

CRMCA Concrete Quality Pre-Construction Checklist

CTAC (Concrete Testing Adherence Collaboration)

The CTAC program is a tool created in Colorado through the Colorado Ready Mixed Concrete Association (CRMCA) to assist in evaluating consistent performance of fresh concrete testing. The CTAC Program is used in several states and provinces across North America to improve the concrete industry through open communication of information observed. Observations can be performed by any person authorized on the project, with a minimum criteria of: (1) the company being a CRMCA member, (2) the individual being currently ACI Concrete Field Testing Technician Grade 1 certified, and (3) having at least six months of concrete testing experience with a supervisor's recommendation.

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Will the CTAC program be utilized on the project during concrete placement? yes no

Who will be the Company Manager sharing reports of the project observations?

The Company Manager is an individual with access to the CTAC Reporting, which could be a Producer, Testing Agency, Contractor, Inspector, Engineer, etc. If there is not a Company Manager on the project, contact the CTAC program at ctac@coloradocaa.org.

Please list any currently known CTAC Observers that might submit observations on the project:

CTAC Observations are not limited to only those listed. This only provides a starting point for collecting data.

Name: _____ Company: _____

Name: _____ Company: _____

Name: _____ Company: _____

Below is a general summary of results being observed in Colorado based on the four main questions of CTAC (2022-2023). This does not represent expectations based on ASTM Standards or ACI recommendations for field concrete testing. These results should be used to start the conversation of expectations on the project. Expectations for Observations should always be to meet requirements 100 percent of the time.

CONCRETE TESTING ADHERENCE COLLABORATION

Project Summary Dashboard for:
[SAVED PROJECT NAME]
[GPS LOCATION; SEARCH RADIUS]

Report Date: [DATE PRINTED]
Date Range: [SEARCH DATE RANGE (PRELISTED NAME)]

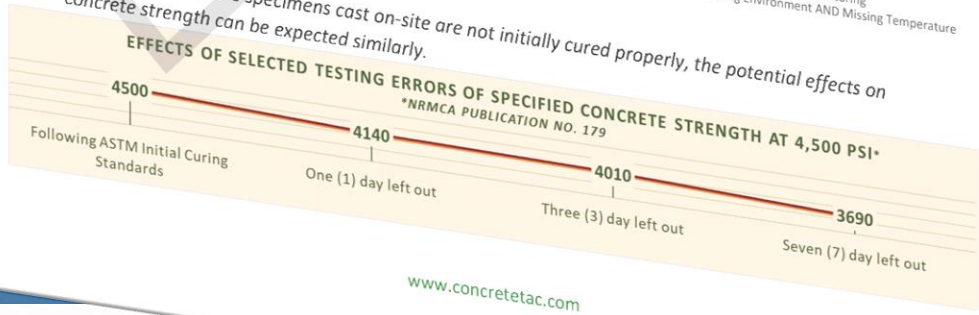
CTAC Company: [ACCESS COMPANY NAME]
No. of Observations: [TOTAL SEARCH #]

The following information summarizes the on-site observations of fresh concrete testing on this project. Since the acceptance of concrete is determined by primarily compressive strength of the cylinders cast on site, ASTM has developed these criteria to accurately determine concrete strength. Any variance in adhering to these standards affects the compressive strength test results. Therefore, falsely affecting concrete acceptance.

The green below indicates the percentage of observations where proper procedures occurred. The red indicates the percentage of observations that do not follow the ASTM procedures specified during design and bidding the project. They indicate items that negatively affect the acceptance cylinder strength on a consistent basis.

Actions must be taken to address these issues to accurately determine concrete strength.

EXAMPLE: if concrete specimens cast on-site are not initially cured properly, the potential effects on concrete strength can be expected similarly.



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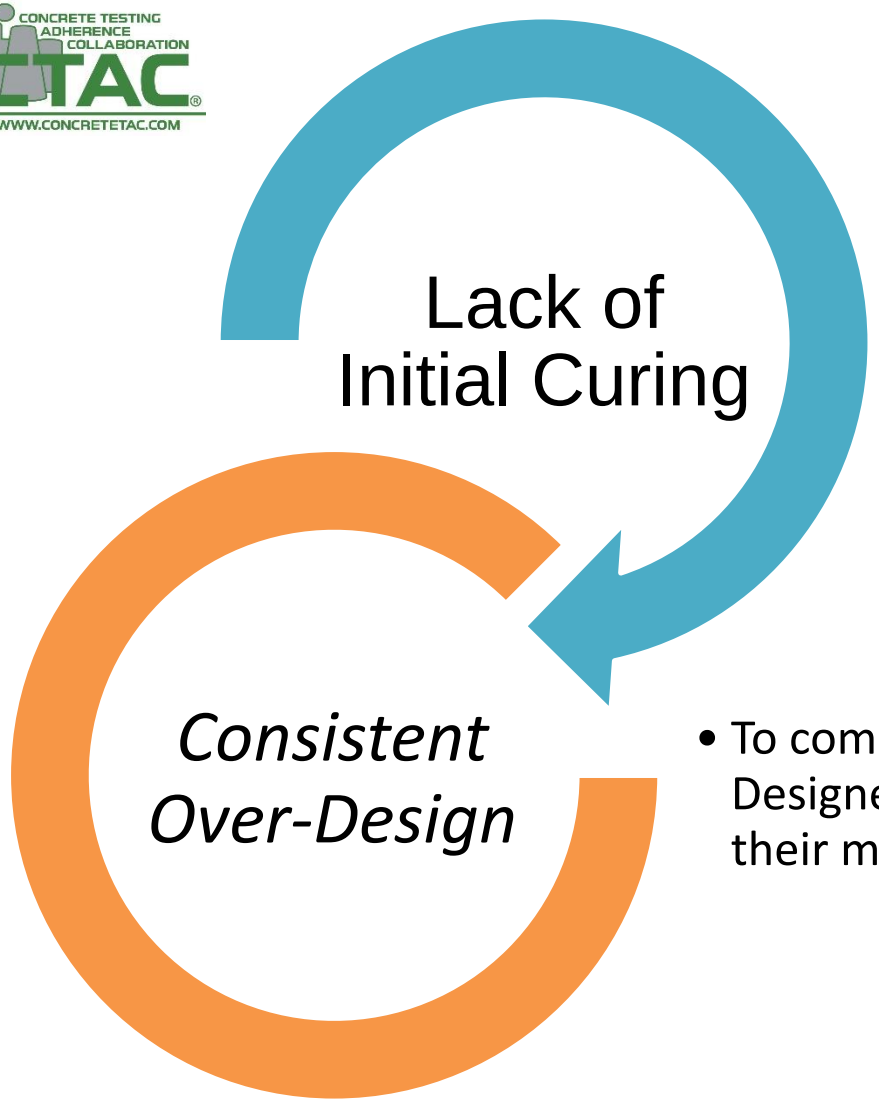
“We can’t fix the problem…”



- *“If initial curing is not in accordance with ASTM C31/C31M, there may be up to a 20% reduction in the 28-day compressive strength.”*

- To compensate, Producers and Designers typically overdesign their mixtures.

Adding 10% or 500 psi for a 5000 psi mixture leads to:

Increased cement materials cost
+
~9% higher embodied carbon

**NRMCA TIP 22 – Reducing Embodied Carbon in Concrete Mixtures*

CTAC Across North America

2023 Current Participation

- CalCIMA (California)
- Colorado Ready Mixed Concrete Association
- Concrete Ontario
- Iowa Ready Mixed Concrete Association (Concrete State)
- Kansas City Concrete Promotional Group (CPG)
- Wisconsin Ready Mixed Concrete Association

Currently Onboarding

- Aggregate and Ready Mix Association of Minnesota
- Texas Aggregates & Concrete Association
- Georgia Ready Mixed Concrete Association

Anticipated Future 2024 Partners

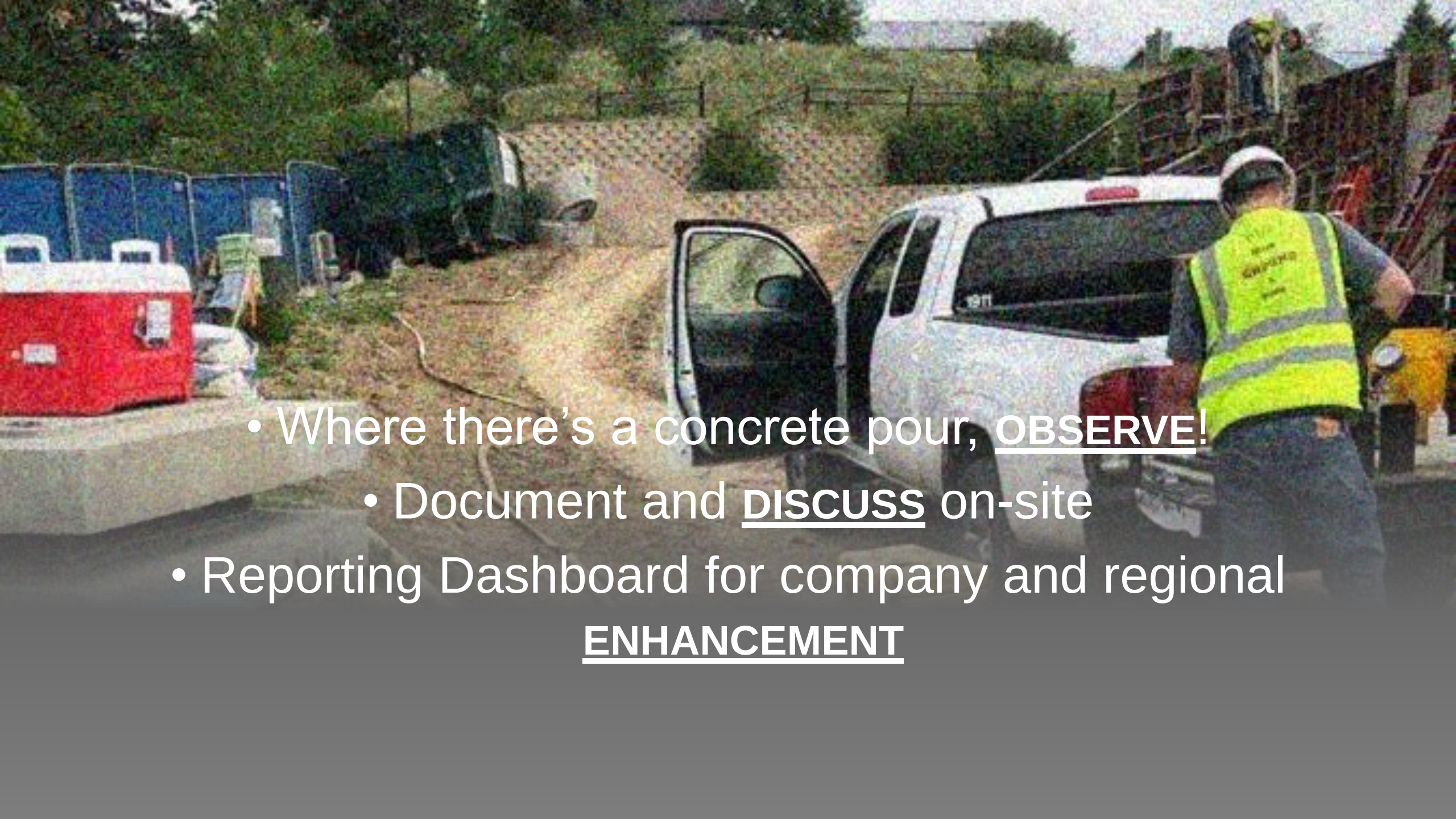
- Arkansas Ready Mixed Concrete Association
- Builders Supply Association of West Virginia
- Carolinas Ready Mixed Concrete Association
- Cement and Concrete Products Industry of Hawaii
- Concrete British Columbia
- Nebraska Concrete & Aggregates Association
- North Dakota Ready Mixed Concrete Association
- South Dakota Ready Mixed Concrete Association
- *Washington Aggregate & Concrete Association*

National Partnership

- National Ready Mixed Concrete Association (NRMCA)
  - Partnered to obtain initial RMC Research & Education Foundation Grant (now **Concrete Advancement Foundation**)
  - Assists with continued development

Regional Comparisons

	CalCIMA	Concrete Ontario	CPG	CRMCA	IRMCA	WRMCA	Avg
Observations (Oct 2022 - Sept 2023)	249	63	426	137	71	66	**169**
Question							
Technician Certified	99%	98%	82%	88%	80%	56%	**84%**
Sampled in Accordance with ASTM C172 / CSA A23.2-1C	42%	70%	73%	68%	80%	74%	**68%**
Tested in accordance with ASTM / CSA Procedures	26%	44%	65%	86%	86%	39%	**58%**
Stored according to ASTM C31 / CSA A23.2-3C	6%	10%	12%	18%	28%	17%	**15%**
Which of the following was utilized for specimen storage?							
Nothing; specimens left in open environment	45%	8%	19%	2%	14%	3%	**15%**
Which type of temperature monitoring device was utilized in the curing environment?							
Nothing	86%	33%	53%	27%	45%	58%	**50%**



- Where there's a concrete pour, **OBSERVE**!
- Document and **DISCUSS** on-site
- Reporting Dashboard for company and regional

ENHANCEMENT

QUESTIONS?
COMMENTS?

www.concretetac.com
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