



**Iron Woman**  
Construction and  
Environmental Services LLC

# IRON WOMAN CONSTRUCTION & ENVI

Compark Village South F1  
Belford & Peoria  
Parker, CO 80134

To:

From:

## SUBMITTAL INFORMATION

Submittal No: 19  
 Submittal Description: Concrete Mix - ~~Conspan Foundation~~ **Site Concrete**  
 Date Submitted: 06/28/2021 **CDOT Class B/D**  
 Response Requested By: 06/29/2021  
 Date Response Received:

## PRODUCT DATA

ITEM #	DESCRIPTION	DWG / SPEC #	SECTION #	ITEM STATUS
	Concretete Mix - Conspan Foundation			New

### Remarks:

Concretete Mix - Conspan Foundation submittal for review and approval ASAP.  
***I certify that the above submitted item(s) have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise noted.***

Submittal reviewed for conformance with CDOT Class B/D spec. Submittal not reviewed for use in Conspan foundation.

Reviewed By:	
Date:	
Status:	<input type="checkbox"/> Approved <input type="checkbox"/> Approved as Note
Comments:	

No Exception Taken  
 Approved as Noted  
 Rejected  
 Revise and Resubmit

This review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections or comments made on the submittal during this review do not relieve contractor from compliance with the requirements of the plans and specifications. Approval of a specific item shall not include approval of an assembly of which the item is a component. Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite, information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of his or her Work with that of all other trades; and for performing all work in a safe and satisfactory manner.

**Manhard Consulting, Ltd.**

Date: 07/07/2021 By: Gary Iwata

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# AGGREGATE INDUSTRIES & METRO MIX CDOT SUBMITTAL

West Central Region  
 Submittal Date: 5/6/2020



Customer:	Various
Project:	Various
Mix Class:	Class B/D
Placement Type:	Hand
Mix Number:	9456738

## MATERIALS

Constituent	Qualification	Date of Certification
Cement 1	ASTM C-150 Type I/II Cement: Holcim, Portland	4/6/2020
Cement 2		
Fly Ash	ASTM C-618 Class F Fly Ash: Boral, Prairie State	2/10/2020
Coarse Aggregate 1	AASHTO M 80. 57/67: Agg Ind, Morrison	1/23/2020
Coarse Aggregate 2		
Coarse Aggregate 3		
Fine Aggregate 1	AASHTO M 6: Agg Ind, Platte Valley	1/30/2020
Fine Aggregate 2		
Fine Aggregate 3		
Water Reducer 1	ASTM C494: Sika, Viscocrete 2100	3/5/2020
Water Reducer 2		
Water Reducer 3		
Hydration Stabilizer	ASTM C494: Sika, Sikatard 440	3/5/2020
Accelerator 1		
Air Entrainment 1	ASTM C260: Sika, AIR	3/5/2020
Air Entrainment 2	ASTM C260: Sika, AEA-14	3/5/2020
Water	Water	

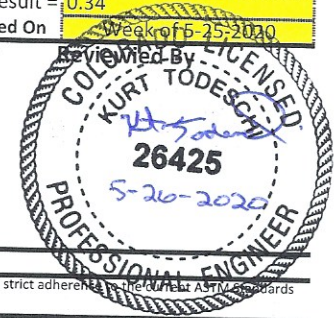
## PROPORTIONS

Constituent	1 cu. yd. (SSD)			
Cement 1	500	lbs./yd		
Fly Ash	125	lbs./yd		
Coarse Aggregate 1	1750	lbs./yd		
Fine Aggregate 1	1241	lbs./yd		
Water Reducer 1	0-6	lbs./yd		
Hydration Stabilizer	0-5	oz/cwt	34.4	oz/yd
Air Entrainment 1	As Needed	oz/cwt	10.9	oz/yd
Air Entrainment 2	As Needed	oz/cwt	1.3	oz/yd
Water	279	oz/cwt	1.3	oz/yd
		lbs./yd	33.5	gal/yd

## LAB DATA

Test	Result	Spec Range	Date of Trial	Test ID	SUPER AIR METER DATA			
					Leak Test		SAM Test Readings	
Slump	6	4" - 8"	4/20/2020	5815Q	Pass	Fail	Test Point	Reading
Air Content	7.20%	5% - 8%	4/20/2020	5815Q	X		1	6.3
Unit Weight	141.6	NA	4/20/2020	5815Q			2	16.31
Relative Yield	1.00	.99 - 1.02	4/20/2020	5815Q			3	28.14
Temperature	70	50F - 90F	4/20/2020	5815Q			4	6.5
W/C Ratio	0.38	0.38	4/20/2020	5815Q			5	16.59
Shrinkage	0.033%	<0.050%	8/14/2018	5815Q			6	28.48
Surface Resistivity	24.3	>12 kΩ-cm @ 28 Days	4/20/2020	5815Q	SAM Result = 0.34			
RCP	NA	<2500 @ 56 Days	NA	NA	Hard Air Cyls Delivered On: Weak of 5-25-2020			

----Compressive Strength (PSI)----		----Flexural Strength (PSI)----	
3 Day	4650		
3 Day	4900		
7 Day	5100		
7 Day	5370		
28 Day	6,550		
28 Day	6,810		
28 Day	6,590		
28 Day Avg	6,650		



Production and delivery in accordance with ASTM C 94 Standard Specification for Ready-Mixed Concrete. Compressive strength performance is conditional with strict adherence to the latest ASTM standards relating to concrete, and the latest revisions of ACI 301 and 318.

**Direct Inquiries To:**  
 Stephen Herald  
 Technical Services Manager (RMX) - (303) 809-5191 / stephen.herald@aggregate-us.com

**SURFACE RESISTIVITY INDICATION OF CONCRETE'S ABILITY TO RESIST CHLORIDE ION PENETRATION (AASHTO T358)**

Project number	<u>20.014, Aggregate Industries - WCR</u>	Date	<u>April 20, 2020</u>
Project name	<u>Aggregate Industries - General Lab Testing 2020</u>	Technician	<u>J. Weinerth</u>
Lab ID number	<u>Aggregate Industries Mix ID No. 9456738 (AI Lab ID No. 5815Q)</u>	Reviewer	<u>R. Zoetewey</u>

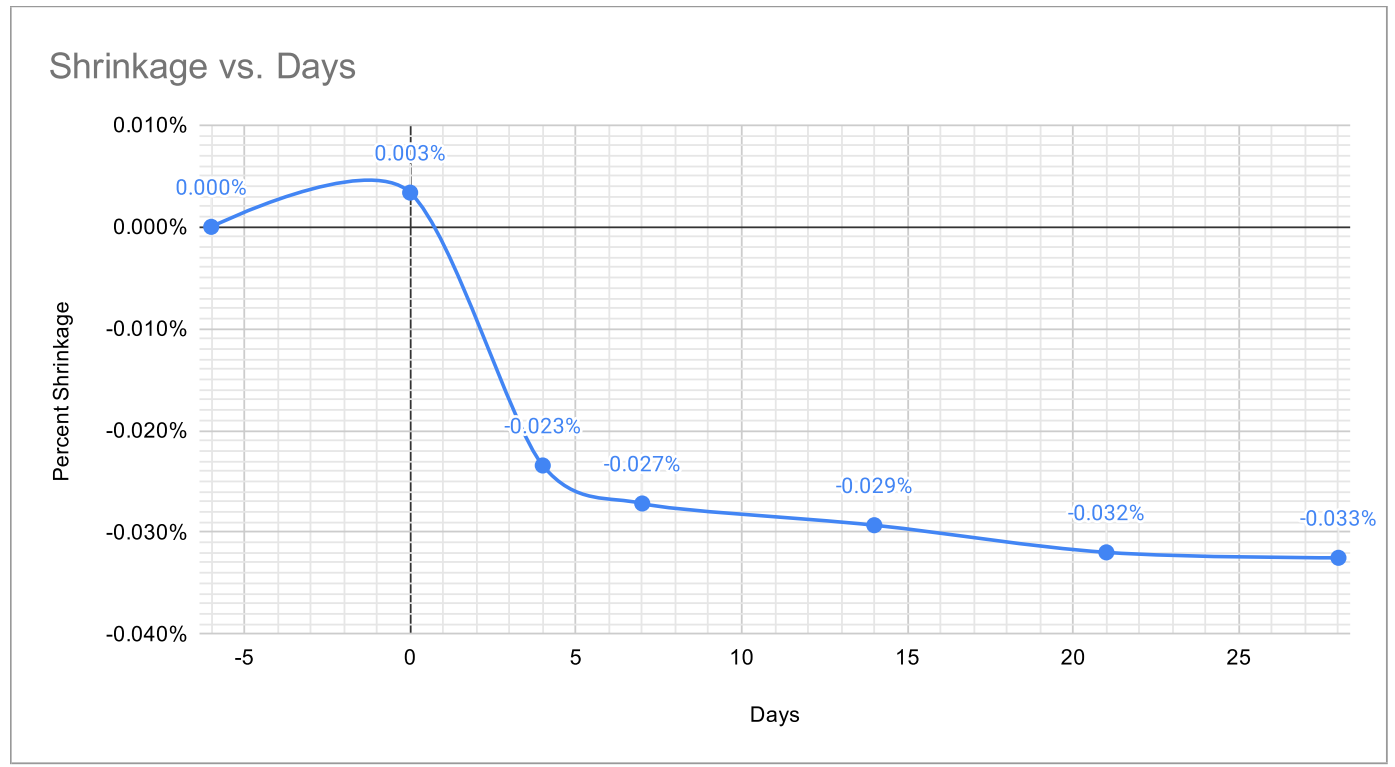
Testing Information	
Location of test sample (from within cast cylinder or core)	Cast Cylinder
Cylinder size (4x8, 6x12)	4x8
Type of concrete	CDOT Class D
Type of cement and percent	Holcim Portland Type I/II, 80%
Type of flyash and percent	Boral - Prairie State, Class F, 20%
Water-cementitious ratio	0.38
Special admixtures and dosage	- -
Core specimen: presence of reinforcement/location	- -
Core Specimen: presence/thickness of overlay	- -
Core Specimen: presence/thickness of surface treatment	- -
Curing condition (lime tank, moist room)	moist room

Surface Resistivity (SR) Readings (kohm-cm)										
Day	14	Date	05/04/20	Remarks	0°	90°	180°	270°	Deviation	Average
<b>Sample</b>	<b>0°</b>	<b>90°</b>	<b>180°</b>	<b>270°</b>	<b>0°</b>	<b>90°</b>	<b>180°</b>	<b>270°</b>	<b>Deviation</b>	<b>Average</b>
A	16.0	15.2	14.4	15.0	16.0	15.0	14.9	16.0	0.6	15.3
B	14.5	16.2	16.3	15.9	15.6	15.4	15.1	16.4	0.6	15.7
									Set average	15.5
									Curing condition correction (x1.1 lime tank or 1.0 for moist room)	<b>15.5</b>
									Penetrability based on test	Moderate

Surface Resistivity (SR) Readings (kohm-cm)										
Day	28	Date	05/18/20	Remarks	0°	90°	180°	270°	Deviation	Average
<b>Sample</b>	<b>0°</b>	<b>90°</b>	<b>180°</b>	<b>270°</b>	<b>0°</b>	<b>90°</b>	<b>180°</b>	<b>270°</b>	<b>Deviation</b>	<b>Average</b>
A	25.0	24.1	22.1	24.4	25.1	24.1	22.8	23.2	1.0	23.9
B	25.0	23.7	24.5	25.1	25.7	24.0	24.9	24.8	0.6	24.7
									Set average	24.3
									Curing condition correction (x1.1 lime tank or 1.0 for moist room)	<b>24.3</b>
									Penetrability based on test	Low

Specimen ID	Mix Date	Mix Time	AI Mix ID	Measurements (0.002 mm)			Difference from Initial			Avg. Expansion
5815Q	4/20/2020	8:00	9456738	A	B	C	A	B	C	
<b>Initial (24 hr)</b>	CJ	4/21/2020	8:00	-0.086	0.016	0.180				
<b>Zero (7 day)</b>	CJ	4/27/2020	8:05	-0.080	0.017	0.198	0.006	0.001	0.018	0.003%
<b>4 day</b>	CJ	5/1/2020	8:00	-0.128	0.126	0.156	0.042	0.110	0.024	-0.023%
<b>7 day</b>	CJ	5/4/2020	8:00	-0.154	0.104	0.132	0.068	0.088	0.048	-0.027%
<b>14 day</b>	CJ	5/11/2020		-0.170	0.088	0.116	0.084	0.072	0.064	-0.029%
<b>21 day</b>	CJ	5/18/2020	8:00	-0.190	0.068	0.096	0.104	0.052	0.084	-0.032%
<b>28 day</b>	JF	5/25/2020	8:10	-0.192	0.066	0.092	0.106	0.050	0.088	-0.033%

Days	Shrinkage
-6	0.000%
0	0.003%
4	-0.023%
7	-0.027%
14	-0.029%
21	-0.032%
28	-0.033%





**Material:** Portland Cement  
**Type:** I-II

# Material Certification Report

**Test Period:** 01-Apr-2020 to 30-Apr-2020  
**Date Issued:** 08-May-2020

## Certification

This cement meets the specifications of ASTM C150 and AASHTO M85 for Type I-II cement.

## General Information

Supplier:	Holcim (US) Inc. d/b/a LafargeHolcim US	Source Location:	Portland Plant
Address:	8700 West Bryn Mawr Ave Chicago, IL 60631		3500 Highway 120 Florence, CO 81226
Contact:		Contact:	Kevin Tate / (719) 371-4615

The following is based on average test data during the test period. The data is typical of product shipped from this source; individual shipments may vary.

## Test Data on ASTM Standard Requirements

Chemical			Physical		
Item	Limit <sup>1</sup>	Result	Item	Limit <sup>1</sup>	Result
SiO <sub>2</sub> (%)	-	19.6	Air Content (%)	12 max	6
Al <sub>2</sub> O <sub>3</sub> (%)	6.0 max	4.5	Blaine Fineness (m <sup>2</sup> /kg)	260 min	428
Fe <sub>2</sub> O <sub>3</sub> (%)	6.0 max	3.3	Autoclave Expansion (%) (C151)	0.80 max	0.00
CaO (%)	-	64.2	Compressive Strength MPa (psi)		
MgO (%)	6.0 max	1.3	1 day	-	21.1 (3060)
SO <sub>3</sub> (%) <sup>2</sup>	3.0 max	3.5	3 day	10.0 (1450) min	33.6 (4870)
Loss on Ignition (%) <sup>5</sup>	3.5 max	2.7	7 day	17.0 (2470) min	38.4 (5570)
Insoluble Residue (%)	1.50 max	0.80	28 day (previous month's data)	-	43.9 (6370)
CO <sub>2</sub> (%)	-	1.6	Initial Vicat (minutes)	45-375	116
CaCO <sub>3</sub> in Limestone (%)	70 min	81	Mortar Bar Expansion (%) (C1038)	0.020 max	0.009
Potential Phase Compositions <sup>3</sup> :					
C <sub>3</sub> S (%)	-	66			
C <sub>2</sub> S (%)	-	5			
C <sub>3</sub> A (%)	8 max	6			
C <sub>4</sub> AF (%)	-	10			
C <sub>3</sub> S + 4.75C <sub>3</sub> A (%)	-	94			

## Test Data on ASTM Optional Requirements

Chemical			Physical		
Item	Limit <sup>1</sup>	Result	Item	Limit <sup>1</sup>	Result
Equivalent Alkalies (%)	-	0.75	Heat of Hydration kJ/kg (cal/g) (ASTM C1702) 3 Days <sup>4</sup>	-	297 (71)

### Notes (\*1-9)

- Dashes in the Limit / Result columns mean Not Applicable.
- It is permissible to exceed the specification limit provided that ASTM C1038 Mortar Bar Expansion does not exceed 0.020% at 14 days.
- Adjusted per Annex A1.6 of ASTM C150 and AASHTO M85.
- Test results represent the most recent value and is provided for information only.
- Limit = 3.0 when limestone is not an ingredient in the final cement product

## Additional Data

Item	Limestone	Inorganic Processing Addition	Base Cement Phase Composition	Result
Amount (%)	4.6	-	C <sub>3</sub> S (%)	69
SiO <sub>2</sub> (%)	14.0	-	C <sub>2</sub> S (%)	5
Al <sub>2</sub> O <sub>3</sub> (%)	4.1	-	C <sub>3</sub> A (%)	6
Fe <sub>2</sub> O <sub>3</sub> (%)	1.2	-	C <sub>4</sub> AF (%)	10
CaO (%)	43.1	-		
SO <sub>3</sub> (%)	0.4	-		



CONSULTANTS  
· ENVIRONMENTAL  
· GEOTECHNICAL  
· MATERIALS  
· FORENSICS

April 29, 2019

Mr. Kevin Tate  
Holcim (US), Inc.  
3500 State Highway 120  
Florence, CO 81226

**Subj: Test Results of ASTM C452  
Holcim Portland Plant Type I/II MA Cement  
AET Project No. 29-20270**

Dear Mr. Tate:

Attached are the referenced test results. You submitted a portland cement sample identified as “Type I/II MA Cement” which arrived at American Engineering Testing, Inc. (AET) on March 29, 2019.

At your request, the referenced cement sample was used to fabricate and test mortar bars in accordance with ASTM C452–15, “Standard Test Method for Potential Expansion of Portland-Cement Mortars Exposed to Sulfate.” Fabrication of the mortar bars was conducted on April 15, 2019.

Test results indicate the average length expansion is below the maximum requirement of ASTM C150/C150M–19, “Standard Specification for Portland Cement, Table 4, Optional Physical Requirements,” for sulfate expansion for a Type V high sulfate portland cement. As stated in Note E of Table 4, cement meeting the Type V high sulfate limit, meets the moderate sulfate resistance requirement of Type II and Type II (MH).

The submitted sample will be retained for a period of thirty days from the date of this report. Unless written instructions are received by that time, the samples will be discarded. The test results represent specifically the samples tested and methods specified.

For further information, please contact me at the number listed below.

Report By:  
American Engineering Testing, Inc.  
*An AASHTO Accredited Laboratory – Aggregates, Cement & Concrete*

A handwritten signature in black ink that reads 'Joseph T. Johnson'.

Joseph T. Johnson  
Supervisor, Cement/Mortar Laboratory  
Phone: 651-659-1354  
[jtjohnson@amengtest.com](mailto:jtjohnson@amengtest.com)

A handwritten signature in black ink that reads 'Julia Johnson'.

Julia Johnson  
Engineer II, Concrete Materials Laboratory  
Phone: 651-999-1384  
[jujohnson@amengtest.com](mailto:jujohnson@amengtest.com)

**ASTM C452 SULFATE EXPANSION TEST RESULTS**  
**HOLCIM PORTLAND PLANT TYPE I-II MA CEMENT**

<b>Test Sample</b>	<b>Length Change at 14 Days, (%)</b>
1	0.016
2	0.017
3	0.018
4	0.018
5	0.017
6	0.015
<b>Average</b>	<b>0.017</b>

\*Maximum permissible range between 6 test specimens is 0.012

\*\*Maximum allowable expansion for Type V cement at 14 days is 0.040%

## ASTM C618 / AASHTO M295 Testing of Prairie State Fly Ash

**Sample Date:** 2/1 - 2/29/20  
**Sample Type:** Monthly  
**Sample ID:** MnDOT split

**Report Date:** 4/9/2020  
**MTRF ID:** 548PS

Chemical Analysis	Results	ASTM Limit Class F / C	AASHTO Limit Class F / C
Silicon Dioxide (SiO <sub>2</sub> )	<u>55.55</u> %		
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> )	<u>18.40</u> %		
Iron Oxide (Fe <sub>2</sub> O <sub>3</sub> )	<u>9.99</u> %		
Sum (SiO <sub>2</sub> +Al <sub>2</sub> O <sub>3</sub> +Fe <sub>2</sub> O <sub>3</sub> )	<u>83.94</u> %	50.0 min	50.0 min
Sulfur Trioxide (SO <sub>3</sub> )	<u>1.07</u> %	5.0 max	5.0 max
Calcium Oxide (CaO)	<u>7.23</u> %	18.0 max / >18.0	18.0 max / >18.0
Magnesium Oxide (MgO)	<u>1.49</u> %		
Sodium Oxide (Na <sub>2</sub> O)	<u>1.21</u> %		
Potassium Oxide (K <sub>2</sub> O)	<u>2.70</u> %		
Sodium Oxide Equivalent (Na <sub>2</sub> O+0.658K <sub>2</sub> O)	<u>2.99</u> %		
Moisture	<u>0.04</u> %	3.0 max	3.0 max
Loss on Ignition	<u>1.06</u> %	6.0 max	5.0 max
Available Alkalies, as Na <sub>2</sub> O <sub>e</sub>	<u>0.77</u> %	Not Required	1.5 max* <small>*when required by purchaser</small>
<b>Physical Analysis</b>			
Fineness, % retained on 45-µm sieve	<u>23.50</u> %	34 max	34 max
Fineness Uniformity	<u>2.15</u> %	±5 max	±5 max
Strength Activity Index - 7 or 28 day requirement			
7 day, % of control	<u>81</u> %	75 min	75 min
28 day, % of control	<u>93</u> %	75 min	75 min
Water Requirement, % control	<u>96</u> %	105 max	105 max
Autoclave Soundness	<u>-0.02</u> %	0.8 max	0.8 max
Density	<u>2.37</u> g/cm <sup>3</sup>		
Density Uniformity	<u>0.40</u> %	±5 max	±5 max

The test data listed herein was generated by applicable ASTM methods. The reported results pertain only to the sample(s) or lot(s) tested. This report cannot be reproduced without permission from Boral Resources.

*Christy Sieg*

Christy Sieg  
Lab Manager



January 23, 2020

Aggregate Industries  
1705 S. Acoma Street  
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results  
Morrison Quarry Aggregate Tests  
ASTM & AASHTO Size No. 57/67 Coarse Aggregate  
ASTM & AASHTO Size No. 4 Coarse Aggregate  
WesTest Project No. 680119

Gentlemen:

Enclosed on Tables 1 and 2 are the results of aggregate physical property and quality tests, done in general accordance with ASTM and AASHTO criteria, on aggregate sampled from the above-referenced source on January 2, 2020.

The test results indicate the material meets ASTM C33, *Standard Specification for Concrete Aggregates*, AASHTO M 80, *Standard Specification for Coarse Aggregate for Hydraulic Cement Concrete* and Colorado Department of Transportation requirements for the properties tested.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,  
WesTest

  
Quyen T. Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.



627 Sheridan Boulevard • Lakewood, CO 80214  
303.975.9959 • office@westest.net

**LABORATORY TEST REPORT**

**CLIENT:** Aggregate Industries  
**SOURCE:** Morrison Quarry  
**SAMPLED BY:** Client  
**PROJECT:** Morrison Quarry Aggregate Testing

**WesTest PROJECT NO.:** 680119  
**REPORT DATE:** January 23, 2020

ASTM & AASHTO Size No. 57/67 Coarse Aggregate

January 2, 2020

Stockpile

**Aggregate Physical Property and Quality Tests (ASTM C33 & AASHTO M 80 Specifications)**

ASTM C117 & C136, AASHTO T 11 & T 27		ASTM C127, AASHTO T 85, Bulk Specific Gravity = 2.636, Bulk Specific Gravity (SSD) = 2.657, Apparent Specific Gravity = 2.694, Absorption = 0.8%		ASTM C131, AASHTO T 96, L.A. Abrasion Grading B, Loss = 28% Specification: 45% Max.		ASTM C142, AASHTO T 112, Clay Lumps & Friable Particles COARSE AGG. = 0.1%, Specification: 2.0% Max.		ASTM C123, AASHTO T 113, Lightweight Particles in Aggregate		ASTM C88, AASHTO T 104, Sodium Sulfate Soundness, 5 Cycles		
SIEVE SIZE	% Passing	Size No. 57 Specification	Size No. 67 Specification	SAMPLE WT. (g)	LIQUID TYPE / SPECIFIC GRAVITY	LIGHTWEIGHT PARTICLES	SPEC.	SIEVE SIZE	GRADING OF ORIGINAL SAMPLE	WEIGHT BEFORE TEST, g	PERCENT PASSING AFTER TEST	WEIGHTED PERCENT LOSS
1-1/2"	100	100	100	5046.1	ZnCl <sub>2</sub> /2.0	0.0%	0.5% Max.	1-1/2" to 1"	9	509.9	0.6	0.1
1"	100	95 - 100	100	5046.1	ZnBr <sub>2</sub> /2.4	0.0%	3.0% Max.	1" to 3/4"	9	669.1	6.1	3.6
3/4"	91	25 - 60	90 - 100					3/4" to 1/2"	59	331.0	8.4	2.7
1/2"	56							1/2" to 3/8"	32	301.8		6
3/8"	34		20 - 55					3/8" to No.4	100	COARSE AGG. TOTAL 97%		12 Max.
# 4	3	0 - 10	0 - 10					TOTAL				
# 8	2	0 - 5	0 - 5									
# 16	1											
# 30	1											
# 50	1											
# 100	1											
# 200	1.0	0 - 1.5	0 - 1.5									
<b>ASTM D4791, Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate, Ratio 5:1</b>												
SAMPLE WT. (g)	FLAT (%)	ELONGATED (%)	FLAT AND ELONGATED (%)	TOTAL (%)								
5009.0	0	0	0	0								

Sum of Clay Lumps, Friable Particles, Chert = 0.1%  
Specification: 3.0% Max.

**ASTM C29, AASHTO T 19,**  
Bulk Density and Voids in Aggregate  
Rodding Method; Bulk Density = 101 pcf  
Voids in Aggregate = 38%

TABLE 1

January 24, 2020

Aggregate Industries  
1705 S. Acoma Street  
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results  
ASTM C1260  
Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)  
ASTM & AASHTO Size No. 57/67 Coarse Aggregate  
ASTM & AASHTO Size No. 4 Coarse Aggregate  
Morrison Quarry  
WesTest Project No. 680119

Gentlemen:

Included as Figure 1 is the result of potential alkali reactivity testing (mortar-bar method), performed on aggregate sampled from the above-referenced source on January 2, 2020. The aggregate was prepared and tested in general accordance with ASTM Procedures. ASTM C1260 defines the potential of an aggregate for deleterious expansion as follows:

<u>Test Expansion</u>	<u>Classification</u>	<u>Potential for Deleterious ASR</u>
< 0.10%	Innocuous	Low
0.10% to 0.20%	Inconclusive	Not Predictable
> 0.20%	Deleterious	High

Based on the test result of 0.03% expansion at 14 days in solution, 16 days after casting, the potential for deleterious alkali-silica behavior of this aggregate in concrete is considered Low.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,  
WesTest

  
Quyen T. Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.



627 Sheridan Boulevard • Lakewood, CO 80214  
303.975.9959 • office@westest.net

**LABORATORY TEST REPORT**  
POTENTIAL ALKALI REACTIVITY OF AGGREGATES  
(MORTAR-BAR METHOD)  
ASTM C1260

REPORT DATE: January 24, 2020

CLIENT: Aggregate Industries  
PROJECT NO.: 680119

SAMPLE DATE: January 2, 2020  
SAMPLE ID: 6801G

**AGGREGATE:**  
SOURCE: Morrison Quarry  
SIZE: ASTM & AASHTO Size No. 57/67 Coarse Aggregate  
SIZE: ASTM & AASHTO Size No. 4 Coarse Aggregate  
COMMENTS: Aggregate graded as per Section 8.2, Table 1

**CEMENT:**  
SOURCE: Holcim  
TYPE: I/II  
AUTOCLAVE EXPANSION: -0.02%  
ALKALIS CONTENT: 0.78%  
COMMENTS: Cement data provided by Holcim

**MIX WATER:**  
W/C RATIO: 0.47

EFFECTIVE GAUGE LENGTH = 250 mm

Specimen	1/8/20	1/9/20	1/13/20		1/16/20		1/20/20		1/23/20	
	Initial	Zero	4 Days		7 Days		11 Days		14 Days	
	Comparator Reading	Comparator Reading	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change
A	0.050	0.210	0.228	0.01%	0.240	0.01%	0.258	0.02%	0.292	0.03%
B	1.596	1.754	1.770	0.01%	1.790	0.01%	1.802	0.02%	1.830	0.03%
C	2.292	2.456	2.466	0.00%	2.466	0.00%	2.500	0.02%	2.536	0.03%
AVERAGE		1.473	1.488	0.01%	1.499	0.01%	1.520	0.02%	1.553	0.03%

**MORTAR BAR EXPANSION**

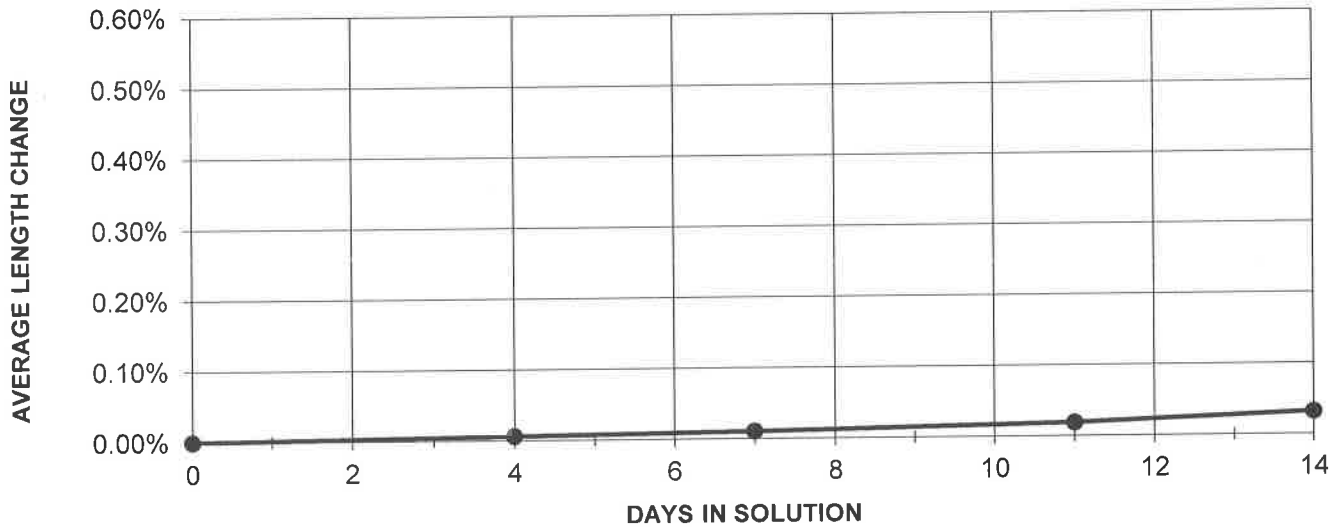


FIGURE 1

January 30, 2020

Aggregate Industries  
1705 S. Acoma Street  
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results  
Platte Valley Pit Aggregate Tests  
ASTM & AASHTO Fine Aggregate  
WestTest Project No. 680719


Gentlemen:

Enclosed on Table 1 are the results of aggregate physical property and quality tests, done in general accordance with ASTM and AASHTO criteria, on aggregate sampled from the above-referenced source on January 2, 2020.

The test results indicate the material meets ASTM C33, *Standard Specification for Concrete Aggregates*, AASHTO M 6, *Standard Specification for Fine Aggregate for Hydraulic Cement Concrete* and Colorado Department of Transportation requirements for the properties tested.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,  
WestTest

  
Quyen T. Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.



627 Sheridan Boulevard • Lakewood, CO 80214  
303.975.9959 • office@westest.net

**CLIENT:** Aggregate Industries  
**SOURCE:** Platte Valley Pit  
**SAMPLED BY:** Client  
**PROJECT:** Platte Valley Pit Aggregate Testing

**WesTest PROJECT NO.:** 680719  
**REPORT DATE:** January 30, 2020

**LABORATORY TEST REPORT**

MATERIAL DESCRIPTION		ASTM & AASHTO Fine Aggregate									
DATE SAMPLED		January 2, 2020									
SAMPLE LOCATION		Stockpile									
Aggregate Physical Property and Quality Tests (ASTM C33 & AASHTO M 6 Specifications)											
<b>ASTM C117 &amp; C136, AASHTO T 11 &amp; T 27</b>				<b>ASTM C128, AASHTO T 84,</b> Bulk Specific Gravity = 2.596, Bulk Specific Gravity (SSD) = 2.616, Apparent Specific Gravity = 2.655, Absorption = 0.8%				<b>ASTM C88, AASHTO T 104,</b> Sodium Sulfate Soundness, 5 Cycles			
SIEVE SIZE	% Passing	ASTM C33 Spec.	AASHTO M 6 Spec.	ASTM D2419, AASHTO T 176, Sand Equivalent Value = 98 Specification: 80 Min. (CDOT)				GRADING OF ORIGINAL SAMPLE	WEIGHT BEFORE TEST, g	PERCENT PASSING AFTER TEST	WEIGHTED PERCENT LOSS
1"								Minus #100	4		
3/4"								# 50 to # 100	9		
1/2"								# 30 to # 50	22	100.1	9.2
3/8"	100	100	100					# 16 to # 30	25	100.1	4.0
# 4	100	95 - 100	95 - 100					# 8 to # 16	29	100.0	1.8
# 8	89	80 - 100	80 - 100					# 4 to # 8	11	100.0	2.8
# 16	60	50 - 85	50 - 85					3/8" to # 4	0		
# 30	35	25 - 60	25 - 60					TOTAL	100	FINE AGG. TOTAL 100%	4
# 50	13	5 - 30	10 - 30					SPECIFICATION:			
# 100	4	0 - 10	2 - 10					ASTM C40, AASHTO T 21, Organic Impurities: Less than Organic Plate No. 1 Specification: Organic Plate No. 3 or Less			
# 200	1.2	0 - 3.0	0 - 2.0								
Fineness Modulus	2.99	2.3 - 3.1	2.3 - 3.1								
COMMENTS:								ASTM C29, AASHTO T 19, Bulk Density and Voids in Aggregate Roding Method; Bulk Density = 106 pcf Voids in Aggregate = 34%			

TABLE 1

February 3, 2020

Aggregate Industries  
1705 S. Acoma Street  
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results  
ASTM C1260  
Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)  
ASTM & AASHTO Fine Aggregate  
Platte Valley Pit  
WesTest Project No. 680719

Gentlemen:

Included as Figure 1 is the result of potential alkali reactivity testing (mortar bar method), performed on aggregate sampled from the above-referenced source on January 2, 2020. The aggregate was prepared and tested in general accordance with ASTM Procedures. ASTM C1260 defines the potential of an aggregate for deleterious expansion as follows:

<u>Test Expansion</u>	<u>Classification</u>	<u>Potential for Deleterious ASR</u>
< 0.10%	Innocuous	Low
0.10% to 0.20%	Inconclusive	Not Predictable
> 0.20%	Deleterious	High

Based on the test result of 0.07% expansion at 14 days in solution, 16 days after casting, the potential for deleterious alkali-silica behavior of this aggregate in concrete is considered Low.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,  
WesTest

Quyên T. Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.



627 Sheridan Boulevard • Lakewood, CO 80214  
303.975.9959 • office@westest.net

**LABORATORY TEST REPORT**  
POTENTIAL ALKALI REACTIVITY OF AGGREGATES  
(MORTAR-BAR METHOD)

ASTM C1260

REPORT DATE: February 3, 2020

CLIENT: Aggregate Industries  
PROJECT NO.: 680719

SAMPLE DATE: January 2, 2020  
SAMPLE ID: 6807C

AGGREGATE:  
SOURCE: Platte Valley Pit  
SIZE: ASTM & AASHTO Fine Aggregate  
COMMENTS: Aggregate graded as per Section 8.2, Table 1

CEMENT:  
SOURCE: Holcim  
TYPE: I/II  
AUTOCLAVE EXPANSION: -0.02%  
ALKALIS CONTENT: 0.78%  
COMMENTS: Cement data provided by Holcim

MIX WATER:  
W/C RATIO: 0.47

EFFECTIVE GAUGE LENGTH = 250 mm

Specimen	1/16/20	1/17/20	1/21/20		1/24/20		1/28/20		1/31/20	
	Initial	Zero	4 Days		7 Days		11 Days		14 Days	
	Comparator Reading	Comparator Reading	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change
A	0.162	0.276	0.322	0.02%	0.336	0.02%	0.396	0.05%	0.452	0.07%
B	2.428	2.562	2.602	0.02%	2.616	0.02%	2.676	0.05%	2.734	0.07%
C	-0.868	-0.734	-0.692	0.02%	-0.682	0.02%	-0.626	0.04%	-0.566	0.07%
AVERAGE		0.701	0.744	0.02%	0.757	0.02%	0.815	0.05%	0.873	0.07%

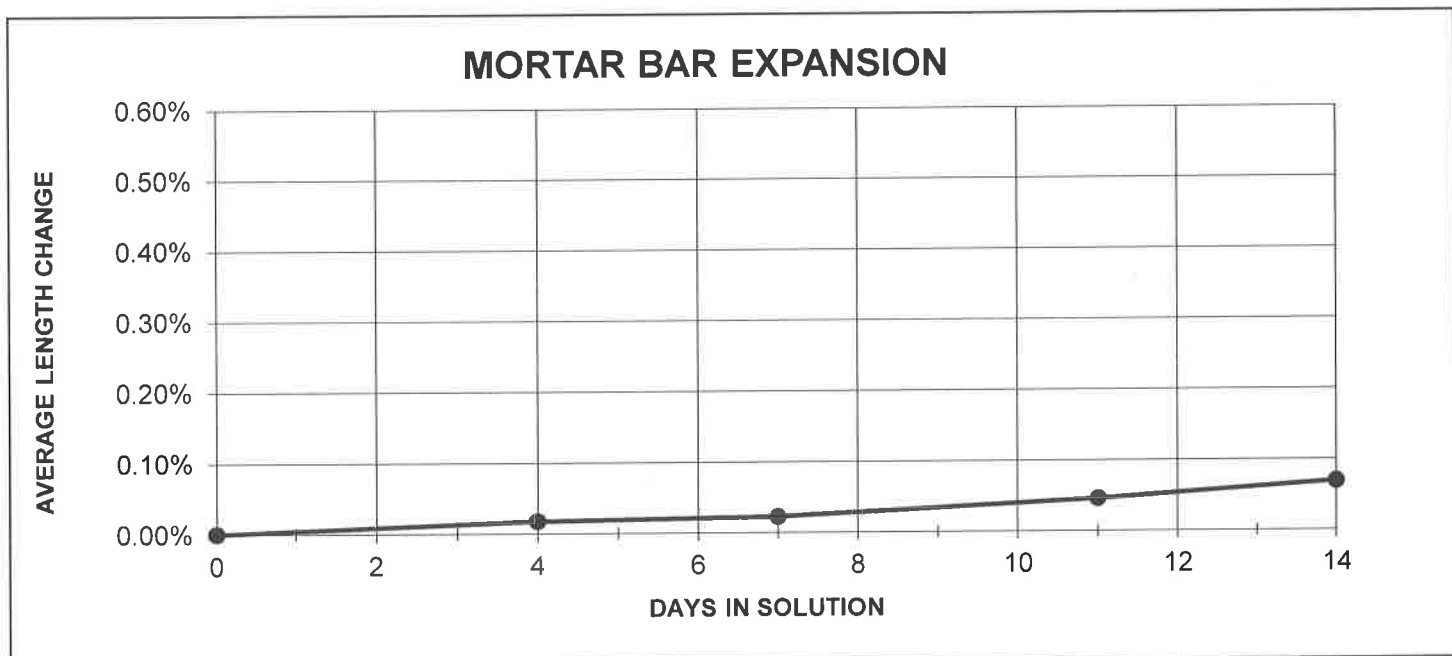


FIGURE 1



Sika Corporation · 201 Polito Avenue · Lyndhurst, NJ 07071 · USA

Mr. Stephen Herald  
Quality Control Manager  
Aggregate Industries  
Denver, CO

**CONTACT**

Nathaniel Artman  
Concrete Specialist  
Phone: +1.330.495.0109  
Mobile: +1.330.495.0109  
artman.nathaniel@us.sika.com

**RE: CERTIFICATE OF COMPLIANCE - SIKA AIR**

March 5, 2020

This is to confirm that Sika AIR, air entraining admixture, conforms to the requirements of ASTM C 260/AASHTO M 154. This is also to confirm that Sika AIR is non-chloride based and does not contain any intentionally added chlorides during manufacturing. The measured chloride content is 30 ppm (0.0030%).

Sika AIR is manufactured under quality control conditions by Sika Corporation. Sika AIR exhibits the typical physical properties as stated in the current data sheet for the product found at Sika's website [www.usa.sika.com](http://www.usa.sika.com) when used as directed within the product's shelf life for one year from the date of installation. **Always read the current applicable product data sheet, safety data sheet and label prior to use.**

**Results may differ based upon statistical variations depending upon mix design, mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.**

**NO OTHER WARRANTIES, EXPRESS OR IMPLIED, SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

Sincerely,

Nathaniel Artman, EI  
Concrete Specialist

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Mr. Stephen Herald  
Quality Control Manager  
Aggregate Industries  
Denver, CO

**CONTACT**

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Phone: +1.330.495.0109  
Mobile: +1.330.495.0109  
artman.nathaniel@us.sika.com

**RE: CERTIFICATE OF COMPLIANCE - SIKA VISCOCRETE-2100**

March 5, 2020

This is to confirm that Sika ViscoCrete-2100, high range water reducing admixture, conforms to the requirements of ASTM C 494/AASHTO M 194, Type A & F. This is also to confirm that Sika ViscoCrete-2100 is non-chloride based and does not contain any intentionally added chlorides during manufacturing. The measured chloride content is 58 ppm (0.0058%).

Sika ViscoCrete-2100 is manufactured under quality control conditions by Sika Corporation. Sika ViscoCrete-2100 exhibits the typical physical properties as stated in the current data sheet for the product found at Sika's website [www.usa.sika.com](http://www.usa.sika.com) when used as directed within the product's shelf life for one year from the date of installation. **Always read the current applicable product data sheet, safety data sheet and label prior to use.**

**Results may differ based upon statistical variations depending upon mix design, mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.**

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Sincerely,

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Concrete Specialist

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Mr. Stephen Herald  
Quality Control Manager  
Aggregate Industries  
Denver, CO

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Mobile: +1.330.495.0109  
artman.nathaniel@us.sika.com

**RE: CERTIFICATE OF COMPLIANCE - SIKATARD 440**

March 5, 2020

This is to confirm that SikaTard 440, hydration controlling admixture, conforms to the requirements of ASTM C 494/AASHTO M 194, Type B & D. This is also to confirm that SikaTard 440 is non-chloride based and does not contain any intentionally added chlorides during manufacturing. The measured chloride content is 30 ppm (0.0030%).

SikaTard 440 is manufactured under quality control conditions by Sika Corporation. SikaTard 440 exhibits the typical physical properties as stated in the current data sheet for the product found at Sika's website [www.usa.sika.com](http://www.usa.sika.com) when used as directed within the product's shelf life for one year from the date of installation. **Always read the current applicable product data sheet, safety data sheet and label prior to use.**

**Results may differ based upon statistical variations depending upon mix design, mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.**

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Sincerely,

Nathaniel Artman, EI  
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Aggregate Industries  
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artman.nathaniel@us.sika.com

**RE: CERTIFICATE OF COMPLIANCE - SIKA AEA-14**

March 24, 2020

This is to confirm that Sika AEA-14, air entraining admixture, conforms to the requirements of ASTM C 260/AASHTO M 154. This is also to confirm that Sika AEA-14 is non-chloride based and does not contain any intentionally added chlorides during manufacturing. The measured chloride content is 81 ppm (0.0081%).

Sika AEA-14 is manufactured under quality control conditions by Sika Corporation. Sika AEA-14 exhibits the typical physical properties as stated in the current data sheet for the product found at Sika's website [www.usa.sika.com](http://www.usa.sika.com) when used as directed within the product's shelf life for one year from the date of installation. **Always read the current applicable product data sheet, safety data sheet and label prior to use.**

**Results may differ based upon statistical variations depending upon mix design, mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.**

**NO OTHER WARRANTIES, EXPRESS OR IMPLIED, SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

Sincerely,

Nathaniel Artman, El  
Concrete Specialist

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# SAFETY DATA SHEET

MATERIAL: READY MIX CONCRETE

## Section 1 – Product Identification

### Product Identifier

**Product Name:** Ready Mix Concrete

**Product Codes:** Ready mix, RMX

(This SDS covers many products. Individual constituents will vary.)

**Synonyms:** Ready mix, Concrete mix, Poured concrete

**Product Form:** Solid blend

**Intended Use of Product:** Typically used as a structural construction component or adjunct

### Name, Address and Telephone of Responsible Party

Aggregate Industries (US)  
24 Crosby Drive  
Bedford, MA 01730  
(888) 646-5246

### Emergency Contact Information:

CHEMTREC: 1-800-424-9300

## Section 2 – Hazards Identification

### Classification of the Substance or Mixture

#### Classification (GHS-US)

Skin Corrosion 1B  
Eye Damage 1  
Skin Sensitizer 1B  
Carcinogen 1A  
Specific Target Organ Toxicity: Single Exposure (Lungs) 3  
Specific Target Organ Toxicity: Repeat Exposure (Lungs) 3

#### Label Elements

#### Hazard Pictograms



#### Signal Word

Danger

#### Hazard Statements

Causes severe skin burns and eye damage  
May cause an allergic skin reaction  
May cause respiratory irritation  
May cause cancer (inhalation)

#### Precautionary Statements

- Prevention** Do not breathe dust.  
Wear protective gloves/protective clothing/eye protection/face protection  
Wash thoroughly after handling.  
Do not handle until all safety precautions have been read and understood.
- Response** **If inhaled:** Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center/doctor.  
**If in eyes:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a doctor.  
**If on skin:** Take off immediately all contaminated clothing. Rinse skin with water. Wash contaminated clothing before reuse.  
**If swallowed:** Rinse mouth. Do NOT induce vomiting. Immediately call a poison center/doctor.
- Storage** Store locked up.
- Disposal** Dispose of contents/container in accordance with local/state/national regulations.

**Other Hazards**

Exposure may aggravate those with pre-existing eye, skin or respiratory conditions or illness.  
Contact with wet material may cause irritation and chemical (caustic) burns on exposed skin (see Section 16 for additional information).

### Section 3 – Composition/Information on Ingredients

Component/Ingredient	CAS #	Percent Present (Range)
Portland cement	65997-15-1	10 - 30
Calcium hydroxide	1305-62-0	15 - 25
Fly Ash*	68131-74-8	0 - 20
Sand (may be composed of varying granitic and silicate materials)	None	0 - 90
Limestone	1317-65-3	25 - 65
Calcium oxide	1305-78-8	0 - 5
Magnesium oxide	1309-48-4	0 - 4
Nuisance Dusts (Particulates not otherwise regulated)	None	< 1 - 5
Crystalline Silica (quartz – respirable)	68131-74-8	0 < 1

**Other Components**

Ready mix concrete is made primarily from materials mined from the earth. A chemical analysis of the material may reveal trace amounts of naturally occurring but potentially harmful chemical compounds such as organic compounds, potassium and sodium compounds, and heavy metals including cadmium, chromium (including hexavalent chromium), nickel and lead. See Section 16 for additional information.

\* Fly ash is a by-product of coal combustion and is primarily composed of silicates and metallic oxides. The exact composition will vary depending on the source of the coal.

### Section 4 – First Aid Measures

**Description of First Aid Measures**

- Eyes** Rinse eyes and under lids cautiously with clean water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.
- Skin** Remove contaminated clothing. Remove dry material from skin, but avoid creating dust. Wash with plenty of water. If skin irritation occurs, get immediate medical advice/attention.
- Inhalation** Remove person to fresh air away from dust and keep comfortable for breathing. If coughing persists, obtain medical attention.
- Ingestion** Do not induce vomiting. If subject is conscious, rinse the mouth with water to remove any material and drink plenty of water to dilute any swallowed material. Do not give drink or attempt to force water to an unconscious person. Get medical advice/attention.

**Important Symptoms and Effects (Acute and Delayed)**

- Eyes** Causes serious eye irritation and may scratch eye surface due to particle abrasion. May cause chemical burns resulting in corneal damage.
- Skin** Causes skin irritation if exposed to moisture on skin creating redness, dryness and itching. Extended exposure to wet material will result in chemical burns to skin, possibly severe.
- Inhalation** May irritate nose and throat if dust is inhaled. Prolonged or repeated inhalation of respirable dust may lead to respiratory tract or lung damage.
- Ingestion** May cause irritation and burns of mouth, throat, stomach and digestive tract if swallowed.

**Recommendations for Immediate Medical Care or Special Treatment**

Seek immediate medical attention for inhalation of large quantities of dust or exposure of wet material over large areas of skin.  
Seek immediate medical attention if material comes into contact with eyes and cannot be immediately removed.

### Section 5 – Fire Fighting Measures

- General Fire Hazards** None. Material is not considered flammable or combustible.
- Extinguishing Media** Use water or water spray to extinguish any fires involving this material.
- Extinguishing Media to Avoid** None.
- Hazards of Combustion** None.
- Fire Fighting Recommendations** Firefighters should always wear full protective gear to fight any fire.  
Refer to Section 9 for flammability information.

### Section 6 – Accidental Release Measures

- Precautions** Avoid creating dust. Prevent material from entering sewers, drains, ditches or waterways.
- Personal Protection** Wear respiratory protection and protective eyewear/clothing to avoid eye or skin contact.

**Emergency Procedures**

Ventilate area and avoid creating dust. Remove unnecessary persons from area.

**Containment Procedures**

Barricade solid material to prevent additional spillage.

**Clean Up Procedures**

Scoop or vacuum up spilled material while avoiding dust creation. Scoop up wet material and place in approved container. Allow wet material to harden before disposal.

**Section 7 – Handling and Storage****Safe Handling Practices**

Avoid contact with skin or eyes. Avoid breathing dust. Use only in well ventilated areas. Wear appropriate personal protective equipment to prevent eye or skin contact and use respiratory protection equipment if dusty or in poorly ventilated areas.

**Safe Storage Measures**

Store in well-ventilated areas away from moisture and incompatible materials. If stored in containers, keep containers closed when not in use.

**Incompatible Materials**

Water/moisture exposure will cause material to generate heat. Keep away from fluoride compounds, strong acids, aluminum, and oxidizers. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas.

**Section 8 – Exposure Controls & Personal Protection****Exposure Limits for Individual Components** (T= Total Respirable, R=Respirable fraction, I=Inhalable-aerosol)

Component	OSHA PEL	ACGIH TLV	NIOSH REL
Portland cement	15 mg/m <sup>3</sup> (T); 5 mg/m <sup>3</sup> (R)	1 mg/m <sup>3</sup> (R)	10 mg/m <sup>3</sup> (T); 5 mg/m <sup>3</sup> (R)
Calcium hydroxide	5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>
Fly ash	15 mg/m <sup>3</sup> (T); 5 mg/m <sup>3</sup> (R)	10 mg/m <sup>3</sup> (T); 3 mg/m <sup>3</sup> (R)	Not established
Limestone	15 mg/m <sup>3</sup> (T); 5 mg/m <sup>3</sup> (R)	Not established	10 mg/m <sup>3</sup> (T); 5 mg/m <sup>3</sup> (R)
Calcium oxide	5 mg/m <sup>3</sup>	2 mg/m <sup>3</sup>	2 mg/m <sup>3</sup>
Magnesium oxide	15 mg/m <sup>3</sup> (T); 5 mg/m <sup>3</sup> (R)	10 mg/m <sup>3</sup>	Not established
Nuisance Dusts (PNOR)	15 mg/m <sup>3</sup> (T); 5 mg/m <sup>3</sup> (R)	10 mg/m <sup>3</sup>	Not established
Crystalline Silica (Quartz)	10 mg/m <sup>3</sup> (R) /(% SiO <sub>2</sub> + 2) 30 mg/m <sup>3</sup> (T) /(% SiO <sub>2</sub> + 2)	0.025 mg/m <sup>3</sup> (R)	0.05 mg/m <sup>3</sup> (R)

**Exposure Controls****Engineering Controls**

Use outdoors in well-ventilated areas; otherwise employ natural or mechanical ventilation to maintain exposure within applicable limits.

**Personal Protection****Face and Eyes**

Avoid contact with skin or eyes. Avoid creating or breathing dust.

Safety glasses with side shields or protective goggles should be worn while using this product. For extremely dusty conditions, non-vented goggles or goggles with indirect venting are recommended. Avoid contact lens wear when using this product.

**Body**

Long sleeved shirts and trousers should be worn while using this material. Wear water-proof boots. If working in dusty conditions, impervious over garments are recommended.

**Respiratory**

If exposure levels cannot be maintained below acceptable limits, suitable particulate-filtering facemasks or respirators approved by MSHA/NIOSH should be worn in accordance with the user's respiratory protection program and OSHA/MSHA guidelines.

**Hands**

Protective gloves with wrist/arm cuffs should be worn to avoid direct contact with skin.

**Section 9 – Physical and Chemical Properties**

<b>Physical State</b>	Gray, flowable semi-fluid	<b>Specific Gravity</b>	1.9 – 2.4
<b>Appearance &amp; Color</b>	Grey/off-white paste	<b>Flash Point/Method</b>	None. Not flammable.
<b>Odor</b>	None	<b>Auto Ignition Temperature</b>	Not determined
<b>pH</b>	>12	<b>Lower Flammability Limit</b>	Not applicable
<b>Boiling Point</b>	> 1000 °C (> 1832 °F)	<b>Upper Flammability Limit</b>	Not applicable
<b>Solubility (Water)</b>	Slight (<5%)	<b>Octanol/H<sub>2</sub>O Coefficient</b>	Not determined
<b>Evaporation Rate</b>	Not applicable	<b>Viscosity</b>	Varies accord to mixture
<b>Melting Point</b>	Not determined	<b>Freezing Point</b>	Not determined
<b>Vapor Density</b>	Not applicable	<b>Explosion Risk: Static</b>	Not considered a hazard
<b>Vapor Pressure</b>	Not applicable	<b>Explosion Risk: Shock</b>	Not considered a hazard

**Section 10 – Stability and Reactivity****Reactivity**

Dry powder reacts with water to create heat and calcium hydroxide.

**Chemical Stability**

Stable at standard temperature and pressures.

<b>Hazardous Reactions</b>	None. Hazardous polymerization will not occur.
<b>Conditions to Avoid</b>	Moisture or wetting powder will cause exothermic heating as product cures.
<b>Incompatible Materials</b>	Avoid contact with strong acids, oxidizers, aluminum and ammonium salts.
<b>Decomposition Hazards</b>	Reacts with water to form calcium hydroxide which can irritate/damage skin. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas.

## Section 11 – Toxicological Information

### Product: Ready mix concrete

<b>Acute Toxicity</b>	Not classified.
<b>LD50/LC50 Data</b>	Not classified.
<b>Skin Corrosion/Irritation</b>	Causes irritation or chemical burns if exposed to skin.
<b>Critical Eye Damage/Irritation</b>	Causes serious eye injury due to chemical burns or mechanical irritation.
<b>Respiratory or Skin Sensitization</b>	May cause an allergic skin reaction in some individuals.
<b>Germ Cell Mutagenicity</b>	Not reported/no data available.
<b>Teratogenicity</b>	Not reported/no data available.
<b>Carcinogenicity</b>	Material contains trace amounts of respirable crystalline silica, which may cause lung cancer through repeated or prolonged exposure to dust.
<b>Specific Organ Toxicity (Single Exposure)</b>	May cause respiratory irritation.
<b>Specific Organ Toxicity (Repeated Exposure)</b>	May cause damage/disease to lungs through repeated or prolonged exposure.
<b>Reproductive Toxicity</b>	Not reported/no data available.
<b>Aspiration Respiratory Hazard</b>	Not reported/no data available.
<b>Symptoms: Inhalation</b>	Coughing, sneezing, mucous discharge and dyspnea. Extended contact may lead to chemical burns to mucous membranes.
<b>Symptoms: Skin Contact</b>	Redness and itching. Extended contact may lead to chemical burns.
<b>Symptoms: Eye Contact</b>	Redness and itching. Extended contact may lead to corneal ulceration and burns.
<b>Symptoms: Ingestion</b>	Irritation and chemical burns of mouth and throat.
<b>Other Toxicological Information</b>	No additional data available.

Components	Toxicity	Carc: IARC	Carc: NTP	Carc: OSHA
Portland cement (refer to Section 16 for more information)	No data	Not listed	Not listed	Not listed
Calcium hydroxide	Oral LD50 Rat 7340 mg/kg	Not listed	Not listed	Not listed
Fly ash	Oral LD50 Rat > 2000 mg/kg	Not listed	Not listed	Not listed
Limestone	No data	Not listed	Not listed	Not listed
Calcium oxide	LC50 (Fish) 1070 mg/l	Not listed	Not listed	Not listed
Magnesium oxide	No data	Not listed	Not listed	Not listed
Nuisance dusts (PNOR)	No data	Not listed	Not listed	Not listed
Crystalline Silica (Quartz) (refer to Section 16 for more information)	Oral LD50 Rat >22,500 mg/kg LC50 Carp >10,000 mg/L (72 hr)	Group 1	Known	Not listed

## Section 12 – Ecological Information

<b>General Ecotoxicity</b>	Not classified.
<b>Persistence and Degradability</b>	Not reported/no data available.
<b>Bioaccumulation Potential</b>	Not reported/no data available.
<b>Mobility in Soil to Groundwater</b>	Not reported/no data available.
<b>Environmental Fate</b>	Not reported/no data available.
<b>Other Environmental Precautions or Information</b>	Avoid release to the environment. Prevent material from entering sewers, drains, ditches or waterways.

## Section 13 – Disposal Considerations

<b>Disposal Methods</b>	Dispose as an inert, non-metallic mineral in accordance with applicable federal, state, and local regulations. Allow wet material to harden before disposal.
<b>Special Considerations</b>	Avoid creation or breathing dust during disposal. Avoid contact with skin and eyes. Refer to Section 8 for personal protection measures.
<b>Other Disposal Information</b>	Prevent material from entering sewers, drains, ditches or waterways.

## Section 14 – Transport Information

Proper Shipping Name	N/A – not regulated.
Hazard Class	N/A – not regulated.
UN Shipping ID Number	N/A – not regulated.
Packing Group	N/A – not regulated.
Environmental/IMDG Codes	N/A – not regulated.

## Section 15 – Regulatory Information

### Federal

This product contains one or more chemical components or ingredients that may require identification and/or reporting under SARA Section 302, SARA Section 311/312/313, CERCLA and/or TSCA. An examination of the components of this product should be conducted by a qualified environmental professional to determine if such identification or reporting is required by federal law.

- Components: Portland cement, Silica (Crystalline), Calcium hydroxide, Calcium oxide, Magnesium oxide, Limestone

### State

This product contains one or more chemical components or ingredients that are included or listed on the hazardous substances lists for one or more of the following states: California, Maine, Massachusetts, Minnesota, New Jersey, Pennsylvania and Rhode Island. An examination of the components of this product should be conducted by a qualified environmental or safety and health professional to determine the specific requirements for those states.

- Components: Portland cement, Silica (Crystalline), Calcium hydroxide, Calcium oxide, Magnesium oxide, Limestone

The state of California requires the following statement (Proposition 65) in regards to this material:

- WARNING! This product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

## Section 16 – Other Information

Date of last revision: September 18, 2015

Prepared and reviewed by: Holcim (US) Inc. Occupational Safety & Health

### Additional information regarding portland cement:

Wet portland cement can cause caustic burns to unprotected skin, sometimes referred to as cement burns. Cement burns may result in blisters, dead or hardened skin, or black or green skin. In severe cases, these burns may extend to the bone and cause disfiguring scars or disability.

Employees cannot rely on pain or discomfort to alert them to cement burns because cement burns may not cause immediate pain or discomfort. By the time an employee becomes aware of a cement burn, much damage has already been done. Accordingly, the safest method to use portland cement is to avoid contact with exposed skin completely. Cement burns can get worse even after skin contact with cement has ended. Any employee experiencing a cement burn is advised to see a health care professional immediately.

Skin contact with wet portland cement can also cause inflammation of the skin, referred to as dermatitis. Signs and symptoms of dermatitis can include itching, redness, swelling, blisters, scaling, and other changes in the normal condition of the skin. Contact with wet portland cement can cause a non-allergic form of dermatitis (called irritant contact dermatitis) which is related to the caustic, abrasive, and drying properties of portland cement.

In addition, hexavalent chromium [Cr(VI)] which may be found in portland cement in trace amounts, can cause an allergic form of dermatitis (allergic contact dermatitis, or ACD) in sensitized employees who work with wet portland cement. When an employee is sensitized, that person's immune system overreacts to small amounts of Cr(VI), which can lead to severe inflammatory reactions upon subsequent exposures. Sensitization may result from a single Cr(VI) exposure, from repeated exposures over the course of months or years, or it may not occur at all. After an employee becomes sensitized, brief skin contact with very small amounts of Cr(VI) can trigger ACD. ACD is long-lasting and employees can remain sensitized to Cr(VI) years after their exposure to portland cement has ended. Medical tests (e.g. skin patch tests) are available that can confirm whether an employee has become dermally sensitized to Cr(VI).

Employees who work with wet portland cement and experience skin problems, including seemingly minor ones, are advised to see a health care professional for evaluation and treatment. In cement-related dermatitis, early diagnosis and treatment can help prevent chronic skin problems.

**Additional information regarding crystalline silica:**

The major concern is silicosis, caused by the inhalation and retention of respirable (extremely small) crystalline silica dust particles. Silicosis can exist in several forms. Chronic or ordinary silicosis (often referred to as simple silicosis) is the most common form of silicosis, and can occur after many years of exposure to relatively low concentrations of airborne respirable crystalline silica dust. Complicated silicosis or progressive massive fibrosis (PMF) may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease secondary to the lung disease. Acute silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis can be fatal.

IARC: The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)." The IARC evaluation noted that "carcinogenicity was not detected in all industrial circumstances studies. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs."

NTP: The National Toxicology Program (NTP), in its Thirteenth Annual Report on Carcinogens, classified "silica, crystalline (respirable)" as a known human carcinogen.

OSHA: Crystalline silica (quartz) is not regulated as a human carcinogen by the Occupational Safety and Health Administration.

**Other important information:**

While the information provided in this document is believed to provide a useful summary of the hazards of portland cement, the information in this document cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product.

The data furnished in this document do not address hazards that may be posed by other materials when mixed with portland cement. Users should review other relevant safety data sheets before working with this product.

The information presented in the Safety Data Sheet is based on current knowledge and publications and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not be interpreted as guaranteeing any specific property of the product.

**SELLER MAKES NO WARRANTY, EXPRESSED OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HOLCIM (US) INC., EXCEPT THAT THE PRODUCT SHALL CONFORM TO CONTRACTED SPECIFICATIONS.**

--END OF SAFETY DATA SHEET--



# CRMCA Concrete Quality Pre-Construction Checklist

[www.crmca.org](http://www.crmca.org)

## Project Information

Project Name: \_\_\_\_\_ Location: \_\_\_\_\_

Project Representatives:

Owner: \_\_\_\_\_ Architect: \_\_\_\_\_

Structural Engineer: \_\_\_\_\_ Construction Manager: \_\_\_\_\_

General Contractor: \_\_\_\_\_ Concrete Supplier: \_\_\_\_\_

Testing Agency: \_\_\_\_\_ Other: \_\_\_\_\_

## Concrete Mixture Design Submittals

Mixture Usage	Mixture Code	Special Attributes	Mixture Design Specifications				Approved Y/N
			Strength @ __ d	Max. w/cm	Slump (in.)	Air (%)	

### Special Attribute Codes:

AE	Air Entrained	CLR	Color Addition	NCA	Non-Chloride Acceleration
NAE	Non-Air Entrained	CI	Corrosion Inhibiting	SF	Silica Fume
LTWT	Lightweight Agg.	SRA	Shrinkage Reduction	UFFA	Ultra Fine Fly Ash
SCC	Self-Consolidating	FP	Fiber Product	HVWT	Heavy Weight Aggregate
HRWR	High Range WRA	HE	High Early Strength	RET	Retardation/ Hyd. Stabilization
Other					

## Concrete Quality Control/ Assurance

(Circle Yes or No)

Independent Testing Laboratory CCRL/AMRL\* accredited including C1077?

yes      no

\*CCRL Lab Listing      AMRL Listing      Name & Certification #

ACI Concrete Strength Testing Technician \_\_\_\_\_

ACI Field Testing Technician(s) \_\_\_\_\_

ACI Certification can be obtained by contacting the CRMCA at \_\_\_\_\_

[www.crmca.org](http://www.crmca.org) \_\_\_\_\_

ACI Certification Verification Link \_\_\_\_\_

### Contractor's Responsibilities in accordance with ACI 301-10 Section 1.6.2

- Allow access to the project site or to the source of materials and assist Owner's testing agency in obtaining and handling samples at the project site or at the source of materials.
- Advise Owner's testing agency at least 24 hours in advance of operations to allow for scheduling of quality assurance tests, review of project requirements, and for the assignment of personnel.
- Provide space and source of electrical power on the project site for facilities to be used for initial curing of concrete test specimens as required by ASTM C31 for the sole use of Owner's quality assurance testing agency.



## CRMCA Concrete Quality Pre-Construction Checklist

### Concrete Sampling and Testing Requirements

Sampling Frequency: \_\_\_\_\_

Sampling Location: \_\_\_\_\_ (Circle Yes or No)

Pt. of truck discharge (in accordance with ASTM C94) yes      no

Pt. of placement (must be specified and comply with OSHA regulations) yes      no

Note 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.

Tests to be performed on each sample: \_\_\_\_\_ (Circle Yes or No)

Slump: yes      no      Compressive Strength: yes      no

Air Content: yes      no      # cylinders per test \_\_\_\_\_

Density (unit wt.): yes      no      Flexural Strength: yes      no

Temperature: yes      no      Other: \_\_\_\_\_ yes      no

Note 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."

### Acceptance/Rejection of Fresh Concrete:

Who has the authority to accept or reject a concrete delivery? \_\_\_\_\_

What criteria will be used to accept or reject a concrete delivery? \_\_\_\_\_ (Circle Yes or No)

Slump: yes      no      Temperature: yes      no

Air Content: yes      no      Density (unit wt.): yes      no

W/CM Ratio: yes      no      Time Limit: yes      no

Note 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."

Who's responsible for adding water and/or air entrainment at the project site? \_\_\_\_\_

Note 4: ASTM C94 section 12.7, allows a 'one-time' water addition as long as the maximum water content for the batch as established by the mixture design proportions has not been exceeded. A 'one-time' water addition may be several distinct additions provided no concrete has been discharged except for slump or slump flow testing. When air content is below the specified level, Section 8.3 allows the concrete supplier to adjust the level with additional air-entraining admixture.

### Test Specimen Storage and Transportation

Standard Curing Method: \_\_\_\_\_ (Concrete Acceptance) \_\_\_\_\_ (Circle Yes or No)

Immersed in water-controlled temperature environment (Preferred) yes      no

Storage box-controlled temperature environment yes      no

Exposed to the environment yes      no



## CRMCA Concrete Quality Pre-Construction Checklist

Who's responsible for providing specimen storage water tank or box? \_\_\_\_\_

Who's responsible for maintaining the temperature of the storage environment? \_\_\_\_\_

Note 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."

Note 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. ..."

### Transportation of Specimens to the Laboratory

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."

When will specimens, cast on days preceding non-work days, be transported to the laboratory?

Please explain: \_\_\_\_\_

<b>Field Curing Method:</b>	(Form or Shoring Removal but not Acceptance)	(Circle Yes or No)
	Storage under conditions consistent with concrete in the structure	yes      no
	Maturity	yes      no

### Acceptance Criteria for Hardened Concrete (ACI 301/318)

In accordance with ACI 301-10, the Owner's testing agency will report results to the Owner, Architect/ Engineer, Contractor, and concrete supplier within 7 days of testing. ACI 301 also requires that the testing agency issue a report immediately, to these parties when it appears that furnished material is not in compliance with the specifications. Test results from standard molded and cured strength specimens will be evaluated separately for each concrete mixture. Evaluation is valid only if tests have been conducted in accordance with specified procedures. Validation of of tests not conducted in accordance with specified procedures will be the responsibility of the Owner's testing agency.

### Acceptance of Concrete Strength in accordance with ACI 301-10

The strength of standard molded and cured strength specimens is satisfactory if the following criteria are met:

- 1.6.6.1 a Every average of three consecutive strength tests equals or exceeds the specified compressive strength  $f_c$ .
- 1.6.6.1 b No strength test result falls below  $f_c$  by more than 500 psi when  $f_c$  is 5000 psi or less, or by more than 0.10  $f_c$  when  $f_c$  is more than 5000 psi.



## CRMCA Concrete Quality Pre-Construction Checklist

### Coring

Section 1.6.6.2- The strength of concrete in the area represented by cores, tested in accordance with ASTM C42, is considered adequate when the average compressive strength of the cores is at least 85% of  $f_c$  and if no single core is less than 75% of  $f_c$ .

### Statement of Acknowledgement

The American Concrete Institute (ACI) and the ASTM International have established many standards and practices related to the performance and safety of concrete construction. The quality of concrete construction is heavily dependent upon the commitment of the project team to the standard practices associated with the production, delivery, placement, and testing of ready mixed concrete. We believe the information in this document accurately reflects the discussion(s) between all attendees.

	(Circle Yes or No)			(Circle Yes or No)	
Owner:	Yes	No	Architect:	Yes	No
Structural Engineer:	Yes	No	Construction Manager:	Yes	No
General Contractor:	Yes	No	Concrete Supplier:	Yes	No
Owners Testing Agency:	Yes	No	Testing Agency:	Yes	No

#### Email Address of Attendees:

Owner: \_\_\_\_\_

Architect: \_\_\_\_\_

Structural Engineer: \_\_\_\_\_

Construction Manager: \_\_\_\_\_

General Contractor: \_\_\_\_\_

Concrete Supplier: \_\_\_\_\_

Owners Testing Agency: \_\_\_\_\_

Testing Agency: \_\_\_\_\_

#### Notes or Comments: