

SUBMITTAL



Submittal number	6.0	Date	06/24/2018
Project	TRAILS AT CROWFOOT #1&9	6954 N. CROWFOOT VALLEY RD. PARKER, CO 80138	
Project number	201810		
Spec section			
Subsection		Status	Open
Current action	Submitted	Ball in court	
Topic	Concrete Mix Design: CDOT Class B/D/P		

Submitter	
Reviewer	
Cc	

Date submitted	06/24/2018	Submission due date	06/24/2018
Released for review	06/24/2018	Review due date	06/29/2018
Date returned		Required on site date	
Date closed			

Notes



LETTER OF TRANSMITTAL

PIPELINE CONTRACTORS

8600 Verbena St.
Commerce City, CO 80022
Office 303-289-4355
Fax 303-289-4353

ISSUED TO:

Owner ATTN: Con Cockrun, Kelley Trucking

DATE:

TRANSMITTAL NO.:

REGARDING:

Project JBS Job No 0150

We are issuing you under separate cover the following (via):

- Blue Prints
- Submittals
- Change Order
- Request for Information
- Copy of a letter
- Shop Drawings

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#	Copies	Item Dated	Item #	Description
	1-Electronic		A-006	Concrete mix designs for concrete structures

- For your bid
- For Approval
- As Requested
- Returned for Correction
- For Review and Comment
- For Pricing

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Prints are loaned to you and are to be returned to us by: Date: _____

Bids are due on or before: Date: _____

COMMENTS

CC:

Amie Parent

Amie Parent
JBS Pipeline Contractors

**TRAILS AT
CROWFOOT
FILING 1 & 9
SECTION 600**



Concrete Water Related Structure Specialists

1.) CDOT Class D/P Mix Design (For Approval)

COLORADO DEPARTMENT OF TRANSPORTATION

Concrete Mix Design Report

Concrete Supplier: Aggregate Industries
Supplier Mix ID : 9456623
Field Compressive Strength: 4500 psi

CDOT Mix Number : 2018007
Item 601 Class B/D/P Concrete
Class 2 Sulfate Resistance and lower*
**Class 3 Sulfate resistance requires a w/cm ratio ≤0.40*

Concrete Mix Proportions (SSD Batch Weights for 1 Cubic Yard)

Cement:	526	Pounds	Holcim (Portland) Type I/II Cement
Fly Ash:	132	Pounds	Boral/Headwaters (Prarie State) Class F Fly Ash
Silica Fume		Pounds	
Coarse Aggregate 1	1750	Pounds	AggInd - Morrison Quarry; #57/67
Coarse Aggregate 2		Pounds	
Coarse Aggregate 3		Pounds	
Fine Aggregate	1169	Pounds	AggInd - Platte River Basin
Admixture	32.9	Ounces	Sika - PlastoCrete 161
Admixture	9.9	Ounces	Sika - ViscoCrete 2100
Admixture	1.3	Ounces	Sika - Air
Admixture		Ounces	
Water	279	Pounds	

Trial Batch Properties

Unit Weight :	139.6	PCF	7-Day Compressive Strength :	4425	psi
W / Cm Ratio :	0.42		14-Day Compressive Strength :		psi
Slump :	3.50	Inches	28-Day Compressive Strength :	6287	psi
Air Content :	6.20	%	56-Day Compressive Strength :		psi
Relative Yield :	1.01		7-Day Flexural Strength :	651	psi
			28-Day Flexural Strength :	863	psi

Aggregate Test Results

	Specific Gravity (SSD)	Absorption
Coarse Aggregate 1 :	2.68	0.6 %
Coarse Aggregate 2 :		%
Coarse Aggregate 3 :		%
Fine Aggregate :	2.63	0.7 %

Comments:

Reviewed by: Val Nicolae **Review date:** 1/10/2018

Please contact CDOT Concrete and Physical Properties Lab at 303-398-6549 with any questions.

COLORADO DEPARTMENT OF TRANSPORTATION

Concrete Mix Design Report

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Comments:

Reviewed by: Val Niculae

Review date: 1/10/2018

Please contact CDOT Concrete and Physical Properties Lab at 303-398-6549 with any questions.

AGGREGATE INDUSTRIES

West Central Region: Ready Mix Division
 CDOT / City Mix Design Submittal Form



Various
 Customer: CDOT
 Project: Various
 Mix Class: Class B/D/P / Hand
 AGG.IND. No.: 9456623
 Trial date: 11/28/2017 Lab I.D. 5516

MATERIALS

Cement	ASTM C-150 Type I/II Holcim Cement: Portland
Fly Ash	ASTM C-618 Class F Boral/Headwaters: Prairie State
Coarse Aggregate 1	AASHTO M 80 No. 57 / 67, AGG.IND.: Morrison
Fine Aggregate 1	AASHTO M 80 No. 8, AGG.IND.: Platte River Basin
Water	Water
Water Reducer 1	ASTM C 494, SIKA: Plastocrete 161
Water Reducer 2	ASTM C 494, SIKA: Viscocrete 2100
Air Entrainment	ASTM C 260, Silka, Air

PROPORTIONS

	1 cu.yd. (SSD)		
Cement	526	lbs./yd	
Fly Ash	132	lbs./yd	
Coarse Aggregate 1	1750	lbs./yd	
Fine Aggregate 1	1169	lbs./yd	
Water	279	lbs./yd.	33.49 gal/yd
Water Reducer 1	5	oz/cwt	32.90 oz/yd
Water Reducer 2	1.5	oz/cwt	9.87 oz/yd
Air Entrainment	0.2	oz/cwt	1.32 oz/yd

PHYSICAL PROPERTIES OF LAB DATA

		Slump Specification	Min	Max
Slump	3.50 in.	→ July 29, 2011 601.05 Slump Revision	1.5	5.5
Air Content	6.20 %	→	5.0%	8.0%
Unit Weight	139.6 pcf			
Relative Yield	1.01 cu.yd.			
Temperature	67 °F			
w/c Ratio	0.42			

COMPRESSIVE STRENGTH

3 Day	3,710	PSI
3 Day	3,780	PSI
7 Day	4,450	PSI
7 Day	4,400	PSI
28 Day	6,240	PSI
28 Day	6,240	PSI
28 Day	6,380	PSI

FLEXURAL STRENGTH

7 Day	651	PSI
7 Day	651	PSI
28 Day	899	PSI
28 Day	877	PSI
28 Day	846	PSI
28 Day	827	PSI

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 current ASTM Standards relating to concrete, and the latest revisions of ACI 301 and 318.

Submittal Notes: Flexural testing performed on 11-10-2017

Please direct inquires to:

Stephen Herald
 Ready Mix Quality Control Manager
 303-777-3052 x 213
stephen.herald@aggregate-us.com

Reviewed by:





Material: Portland Cement
Type: I-II

Material Certification Report

Test Period: 01-Nov-2017 to 30-Nov-2017
Date Issued: 07-Dec-2017

Certification

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

General Information

Supplier: Holcim	Source Location: Portland Plant
Address: 3500 Highway 120 Florence, CO 81226	3500 Highway 120 Florence, CO 81226
Contact: Kevin Tate / (719) 288-1431	Contact:

The following is based on average test data during the test period. The data is typical of cement shipped by Holcim; individual shipments may vary.

Test Data on ASTM Standard Requirements

Chemical			Physical		
Item	Limit ¹	Result	Item	Limit ¹	Result
SiO ₂ (%)	-	19.5	Air Content (%)	12 max	8
Al ₂ O ₃ (%)	6.0 max	4.4	Blaine Fineness (m ² /kg)	260 min	443
Fe ₂ O ₃ (%)	6.0 max	3.0	Autoclave Expansion (%) (C151)	0.80 max	0.00
CaO (%)	-	62.3	Compressive Strength MPa (psi)		
MgO (%)	6.0 max	1.3	1 day	-	20.9 (3030)
SO ₃ (%) ²	3.0 max	3.5	3 day	10.0 (1450) min	30.9 (4480)
Loss on Ignition (%) ⁵	3.5 max	2.6	7 day	17.0 (2470) min	36.4 (5280)
Insoluble Residue (%)	1.50 max	0.72	28 day	-	45.9 (6660)
CO ₂ (%)	-	1.6	Initial Vicat (minutes)	45-375	107
CaCO ₃ in Limestone (%)	70 min	80			
Potential Phase Compositions ³ :					
C ₃ S (%)	-	58			
C ₂ S (%)	-	10			
C ₃ A (%)	8 max	6			
C ₄ AF (%)	-	9			
C ₃ S + 4.75C ₃ A (%)	-	89			

Test Data on ASTM Optional Requirements

Chemical			Physical		
Item	Limit ¹	Result	Item	Limit ¹	Result
Equivalent Alkalies	-	0.78	Heat of Hydration kJ/kg (cal/g) (ASTM C1702) 3 Days ⁴	-	349 (83)
			Mortar Bar Expansion (%) (C1038)	-	0.010

Notes (*1-9)

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

Additional Data

Item	Limestone	Inorganic Processing Addition	Base Cement Phase Composition	Result
Amount (%)	4.4	-	C ₃ S (%)	81
SiO ₂ (%)	11.6	-	C ₂ S (%)	11
Al ₂ O ₃ (%)	3.1	-	C ₃ A (%)	7
Fe ₂ O ₃ (%)	1.3	-	C ₄ AF (%)	9
CaO (%)	45.4	-		
SO ₃ (%)	0.5	-		



CONSULTANTS
ENVIRONMENTAL
GEOTECHNICAL
MATERIALS
FORENSICS

April 24, 2017

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. 29-02463**

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 AET on March 31, 2017.

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 10, 2017.

Test results indicate the average length expansion is below the maximum requirement of ASTM C150/C150M-17, "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 F 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
Fax: 651-647-2744
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

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

Test Sample	Length Change at 14 Days, (%)
1	0.027
2	0.029
3	0.028
4	0.027
5	0.030
6	0.029
Average	0.028

*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: 7/29 - 7/31/17
Sample Type: 3200-ton
Sample ID:

Report Date: 9/7/2017
MTRF ID: 2136PS

Chemical Analysis	Results	ASTM Limit Class F/C	AASHTO Limit Class F/C
Silicon Dioxide (SiO ₂)	<u>55.88</u> %		
Aluminum Oxide (Al ₂ O ₃)	<u>18.34</u> %		
Iron Oxide (Fe ₂ O ₃)	<u>10.98</u> %		
Sum (SiO ₂ +Al ₂ O ₃ +Fe ₂ O ₃)	<u>85.20</u> %	70.0/50.0 min	70.0/50.0 min
Sulfur Trioxide (SO ₃)	<u>0.98</u> %	5.0 max	5.0 max
Calcium Oxide (CaO)	<u>5.57</u> %		
Magnesium Oxide (MgO)	<u>1.48</u> %		
Sodium Oxide (Na ₂ O)	<u>1.22</u> %		
Potassium Oxide (K ₂ O)	<u>2.47</u> %		
Sodium Oxide Equivalent (Na ₂ O+0.658K ₂ O)	<u>2.85</u> %		
Moisture	<u>0.16</u> %	3.0 max	3.0 max
Loss on Ignition	<u>0.46</u> %	6.0 max	5.0 max

Physical Analysis

Fineness, % retained on 45-µm sieve	<u>24.78</u> %	34 max	34 max
Fineness Uniformity	<u>2.34</u> %	±5 max	±5 max
Strength Activity Index - 7 or 28 day requirement			
7 day, % of control	<u>88</u> %	75 min	75 min
28 day, % of control	<u>91</u> %	75 min	75 min
Water Requirement, % control	<u>95</u> %	105 max	105 max
Autoclave Soundness	<u>0.01</u> %	0.8 max	0.8 max
Density	<u>2.45</u>		
Density Uniformity	<u>1.08</u> %	±5 max	±5 max

Headwaters Resources certifies that pursuant to current ASTM C618 protocol for testing, the test data listed herein was generated by applicable ASTM methods and meets the requirements of ASTM C618.


Doug Rhodes, CET
Facility Manager



February 21, 2017

Aggregate Industries
1705 S. Acoma Street
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results
Morrison Quarry ASTM C 33 Aggregate Tests
ASTM C 33 Size No. 57/67 Coarse Aggregate
ASTM C 33 Size No. 4 Coarse Aggregate
WesTest Project No. 527217

Gentlemen:

Included as Tables 1 and 2 are the results of aggregate physical property and quality tests, done in general accordance with ASTM and AASHTO criteria, on concrete aggregate sampled from the above-referenced source on January 10, 2017.

The test results indicate the material meets the requirements of ASTM C 33, *Standard Specifications for Concrete Aggregates* and the 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


Quyên T. Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.



627 Shredon Blvd - Lakewood, CO 80214
303 975 9959 • office@wes-test.net

LABORATORY TEST REPORT

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

Wes Test PROJECT NO.: 527217

REPORT DATE: February 21, 2017

MATERIAL DESCRIPTION	ASTM C 33 Size No. 57/67 Coarse Aggregate
DATE SAMPLED	January 10, 2017
SAMPLE LOCATION	Stockpile

Aggregate Physical Property and Quality Tests (ASTM C 33 Specifications)

ASTM C 117 & C 136, AASHTO T 11 & T 27		ASTM C 127, AASHTO T 85, Bulk Specific Gravity = 2.663, Bulk Specific Gravity (SSD) = 2.678, Apparent Specific Gravity = 2.704, Absorption = 0.6%		ASTM C 131, AASHTO T 96, L.A. Abrasion Grading B, Loss = 22% Specification: 45% Max.		ASTM C 142, AASHTO T 112, Clay Lumps & Friable Particles COARSE AGG. = 0.0%, Specification: 3.0% Max.		ASTM C 123, AASHTO T 113, Lightweight Particles in Aggregate		ASTM C 88, AASHTO T 104, Magnesium/Sodium Sulfate Soundness, 5 Cycles		
SIEVE SIZE	% Passing	ASTM No. 57 Specification	ASTM No. 67 Specification	Grading B, Loss = 22% Specification: 45% Max.	Grading B, Loss = 22% Specification: 45% Max.	Grading B, Loss = 22% Specification: 45% Max.	Grading B, Loss = 22% Specification: 45% Max.	Grading B, Loss = 22% Specification: 45% Max.	Grading B, Loss = 22% Specification: 45% Max.	PERCENT PASSING AFTER TEST		WEIGHTED PERCENT LOSS
										Mag.	Sod.	
1-1/2"	100	100										
3/4"	100	95 - 100	100									
1/2"	92			90 - 100								
3/8"	52	25 - 60										
# 4	35			20 - 55								
# 8	8	0 - 10	0 - 10									
# 16	3	0 - 5	0 - 5									
# 30	2											
# 50	2											
# 100	2											
# 200	1.2	0 - 1.5	0 - 1.5									
COMMENTS SPECIFICATION: ASTM C 29, AASHTO T 19, Bulk Density and Voids in Aggregate Rodding Method; Bulk Density = 99 pcf Voids in Aggregate = 40%												

TABLE 1

February 14, 2017

Aggregate Industries
1705 S. Acoma Street
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results
ASTM C 1260
Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C 33 Size No. 57/67 Coarse Aggregate
ASTM C 33 Size No. 4 Coarse Aggregate
Morrison Quarry
WesTest Project No. 527217

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 10, 2017. The aggregate was prepared and tested in general accordance with ASTM Procedures. ASTM C 1260 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 0.04% 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 C 1260

CLIENT: Aggregate Industries
PROJECT NO.: 527217

REPORT DATE: February 14, 2017
SAMPLE DATE: January 10, 2017
SAMPLE ID: 52721

AGGREGATE: SOURCE: Morrison Quarry SIZE: ASTM C 33 Size No. 57/67 Coarse Aggregate SIZE: ASTM C 33 Size No. 4 Coarse Aggregate COMMENTS: Aggregate graded as per Section 8.2, Table 1										
CEMENT: SOURCE: Holcim TYPE: I/II AUTOCLAVE EXPANSION: -0.01% ALKALIS CONTENT: 0.53% (as Na equivalent) COMMENTS: Cement data provided by Holcim										
MIX WATER: W/C RATIO: 0.47										
EFFECTIVE GAUGE LENGTH = 250 mm										
Specimen	1/12/17	1/13/17	1/17/17		1/20/17		1/24/17		1/27/17	
	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	-0.266	-0.092	-0.082	0.00%	-0.076	0.01%	-0.022	0.03%	-0.012	0.03%
B	1.136	1.292	1.302	0.00%	1.328	0.01%	1.378	0.03%	1.398	0.04%
C	-0.334	-0.178	-0.168	0.00%	-0.138	0.02%	-0.092	0.03%	-0.062	0.05%
AVERAGE		0.341	0.351	0.00%	0.371	0.01%	0.421	0.03%	0.441	0.04%

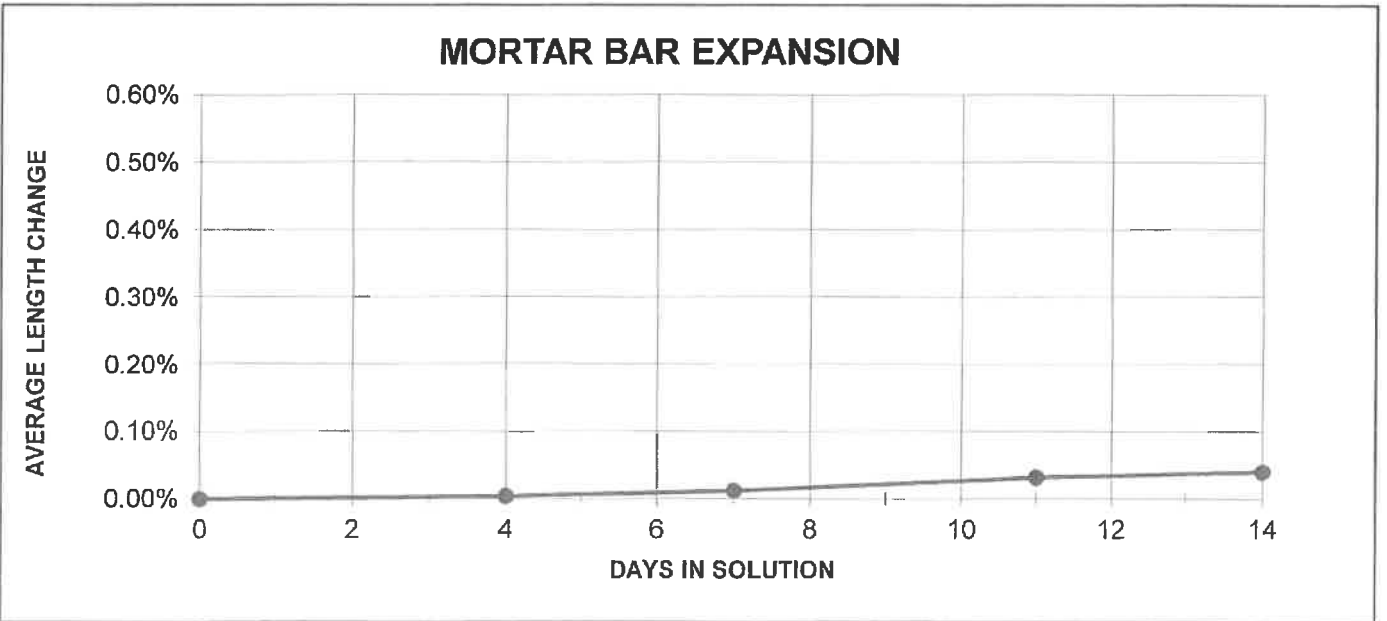


FIGURE 1



627 Sheridan Boulevard • Lakewood, CO 80214

P: 303.975.9959 • F: 303.975.9969

office@westest.net • www.westest.net

February 7, 2017

Aggregate Industries
1705 S. Acoma Street
Denver, CO 80223

Attention: Mr. John Cheever

Subject: Laboratory Test Results
Platte Valley Pit ASTM C 33 Aggregate Tests
ASTM C 33 Fine Aggregate
ASTM C 33 Size No. 8 Coarse Aggregate
ASTM C 33 Size No. 9 Coarse Aggregate, Squeegee
ASTM C 33 Size No. 67 Coarse Aggregate
WesTest Project No. 526717


Gentlemen:

Included as Tables 1 through 4 are the results of aggregate physical property and quality tests, done in general accordance with ASTM and AASHTO criteria, on concrete aggregate sampled from the above-referenced source on January 10, 2017.

The test results indicate the material meets the requirements of ASTM C 33, *Standard Specifications for Concrete Aggregates* and the 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. Lju, EIT



Reviewed by:

Dylan A. Hullinger, P.E.





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10000
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LABORATORY TEST REPORT

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

WesTest PROJECT NO.: 526717
 REPORT DATE: February 7, 2017

MATERIAL DESCRIPTION		ASTM C 33 Fine Aggregate	
DATE SAMPLED		January 10, 2017	
SAMPLE LOCATION		Stockpile	
Aggregate Physical Property and Quality Tests (ASTM C 33, AASHTO M 6 Specifications)			
ASTM C 117 & C 136, AASHTO T 11 & T 27		ASTM C 128, AASHTO T 84, Bulk Specific Gravity = 2.615, Bulk Specific Gravity (SSD) = 2.633, Apparent Specific Gravity = 2.663, Absorption = 0.7%	
SIEVE SIZE	% Passing	ASTM C 33 Spec	AASHTO M 6 Spec.
# 3/4"			
# 2"			
# 4"	100	100	100
# 8"	100	95 - 100	95 - 100
# 16"	94	80 - 100	80 - 100
# 30"	70	50 - 85	50 - 85
# 60"	43	25 - 60	25 - 60
# 100"	15	5 - 30	10 - 30
# 200"	4	0 - 10	2 - 10
Fineness Modulus	2.70	0 - 3.0	0 - 2.0
COMMENTS	2.3 - 3.1	2.3 - 3.1	2.3 - 3.1
		ASTM D 2419, AASHTO T 176. Sand Equivalent Value = 92 Specification: 80 Min. (CDOT)	
		ASTM C 142, AASHTO T 112. Clay Lumps & Friable Particles FINE AGG = 0.0%. Specification: 3.0% Max.	
		ASTM C 123, AASHTO T 113. Lightweight Particles in Aggregate	
SAMPLE WT	LIQUID TYPE / SPECIFIC GRAVITY	LIGHTWEIGHT PARTICLES	SPEC
200.6	ZnCl ₂ /2.0	0.0%	0.5% Max.
200.6	ZnBr ₂ /2.4	0.0%	3.0% Max.
		ASTM C 88, AASHTO T 104, Sodium Sulfate Soundness, 5 Cycles	
SIEVE SIZE	GRADING OF ORIGINAL SAMPLE	WEIGHT BEFORE TEST, 9	PERCENT PASSING AFTER TEST
Minus #100	4		
# 50 to # 100	14		
# 30 to # 50	26	99.9	2.3
# 16 to # 30	27	100.0	3.2
# 8 to # 16	24	100.0	2.0
# 4 to # 8	6	100.1	3.7
3/8" to # 4	0		
TOTAL	100	FINE AGG. TOTAL 100%	2
		SPECIFICATION:	
		ASTM C 40, AASHTO T 21, Organic Impurities: Less than Organic Plate No. 1 Specification: Organic Plate No. 3 or Less	
		ASTM C 29, AASHTO T 19. Bulk Density and Voids in Aggregate Roading Method; Bulk Density = 106 pcf Voids in Aggregate = 35%	

TABLE 1



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

LABORATORY TEST REPORT
POTENTIAL ALKALI REACTIVITY OF AGGREGATES
(MORTAR-BAR METHOD)
ASTM C 1260

CLIENT: Aggregate Industries
PROJECT NO.: 526717

REPORT DATE: February 7, 2017
SAMPLE DATE: January 10, 2017
SAMPLE ID: 5267L

AGGREGATE:										
SOURCE: Platte Valley Pit										
SIZE: ASTM C 33 Fine Aggregate										
COMMENTS: Aggregate graded as per Section 8.2, Table 1										
CEMENT:										
SOURCE: Holcim										
TYPE: I/II										
AUTOCLAVE EXPANSION: -0.01%										
ALKALIS CONTENT: 0.53% (as Na equivalent)										
COMMENTS: Cement data provided by Holcim										
MIX WATER:										
W/C RATIO: 0.47										
EFFECTIVE GAUGE LENGTH = 250 mm										
	1/12/17	1/13/17	1/17/17		1/20/17		1/24/17		1/27/17	
	Initial	Zero	4 Days		7 Days		11 Days		14 Days	
Specimen	Comparator Reading	Comparator Reading	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change
A	2.166	2.338	2.344	0.00%	2.376	0.02%	2.434	0.04%	2.456	0.05%
B	-0.212	-0.044	-0.032	0.00%	-0.004	0.02%	0.042	0.03%	0.062	0.04%
C	-0.004	0.160	0.166	0.00%	0.210	0.02%	0.262	0.04%	0.302	0.06%
AVERAGE		0.818	0.826	0.00%	0.861	0.02%	0.913	0.04%	0.940	0.05%

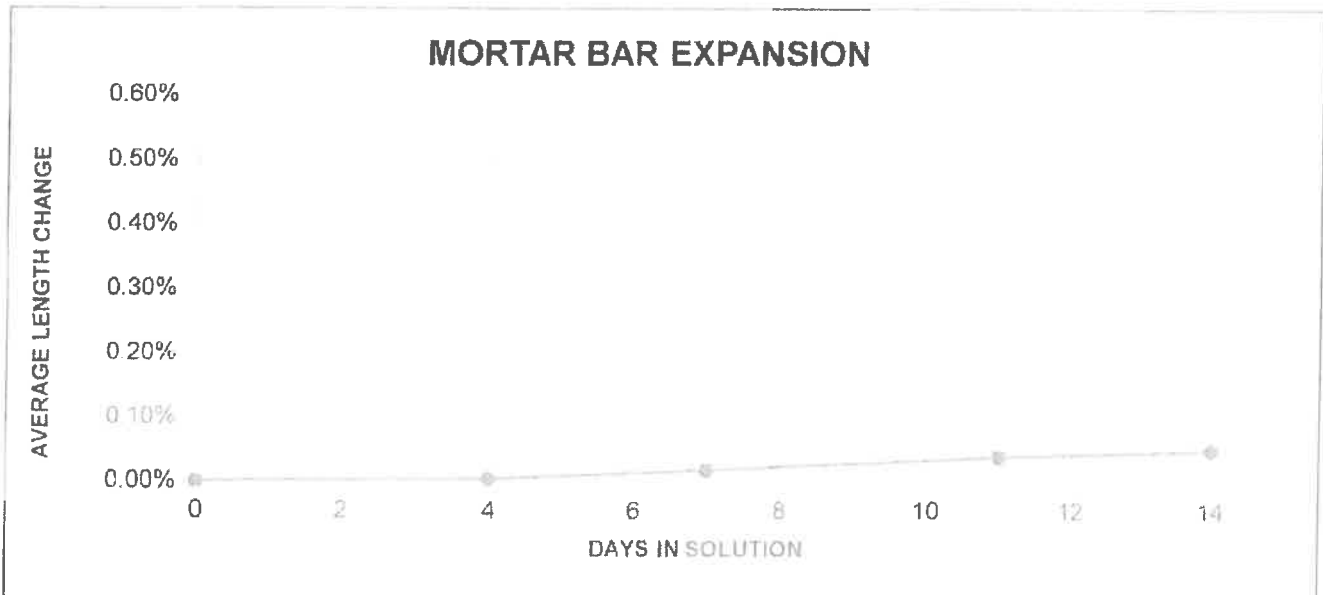


FIGURE 1

BUILDING TRUST



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

January 5, 2018

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 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,

A handwritten signature in black ink, appearing to read "Nathaniel Artman", written over a horizontal line.

Nathaniel Artman, EI
Concrete Specialist

SIKA CORPORATION

201 Polito Avenue · Lyndhurst · NJ 07071 · USA
Phone: +1 201 933 8800 · Fax: +1 201 933 6225 · www.usa.sika.com

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Denver, CO

CONTACT

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

RE: CERTIFICATE OF COMPLIANCE - SIKA VISCOCRETE-2100

January 5, 2018

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 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,

A handwritten signature in black ink, appearing to read "Nathaniel Artman", written over a light grey horizontal line.

Nathaniel Artman, EI
Concrete Specialist

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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 - PLASTOCRETE 161

January 5, 2018

This is to confirm that Plastocrete 161, water reducing admixture, conforms to the requirements of ASTM C 494/AASHTO M 194, Type A, B & D. This is also to confirm that Plastocrete 161 is non-chloride based and does not contain any intentionally added chlorides during manufacturing. The measured chloride content is 175 ppm (0.0175%).

Plastocrete 161 is manufactured under quality control conditions by Sika Corporation. Plastocrete 161 exhibits the typical physical properties as stated in the current data sheet for the product found at Sika's website 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
Aggregate Industries

CONTACT

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

RE: COMPATIBILITY OF SIKA ADMIXTURES

March 10, 2017

This is to confirm the below admixtures are compatible.

Product	Description	ASTM Designation
Sika AIR	Air Entraining	ASTM C 260
Plastocrete-161	Water Reducing	ASTM C 494, Type A, B & D
Sika ViscoCrete-2100	High Range Water Reducing	ASTM C 494, Type A & F
SikaTard 440	Hydration Stabilizing	ASTM C 494, Type B & D
SikaSet NC	Set Accelerating	ASTM C 494, Type C & E
Sika Control 40	Shrinkage Reducing	ASTM C 494, Type S
Sika Control 75	Shrinkage Reducing	ASTM C 494, Type S
Sika ViscoFlow-2020	Slump Retaining	ASTM C 494, Type S
Sika Watertight Concrete Powder	Permeability Reducing	ASTM C 494, Type F & S
Sika Stabilizer 300 SCC	Viscosity Modifying	ASTM C 494, Type S
Sika-CNI	Corrosion Inhibitor	ASTM C 1582
Sikacrete-950DP	Silica Fume	ASTM C 1240
Sika Lightcrete Powder	Flowable Fill Admixture	n/a

All admixtures must be batched according to the manufacturer recommendations. For more information please refer to the Technical Data Sheets available at www.usa.sika.com.

In case of any further questions, please feel free to contact me.

NO OTHER WARRANTIES, EXPRESSED 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.

Respectfully,

Nathaniel Artman, EI
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
Containment Procedures
Clean Up Procedures

Ventilate area and avoid creating dust. Remove unnecessary persons from area.
 Barricade solid material to prevent additional spillage.
 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 ³ (T); 5 mg/m ³ (R)	1 mg/m ³ (R)	10 mg/m ³ (T); 5 mg/m ³ (R)
Calcium hydroxide	5 mg/m ³	5 mg/m ³	5 mg/m ³
Fly ash	15 mg/m ³ (T); 5 mg/m ³ (R)	10 mg/m ³ (T); 3 mg/m ³ (R)	Not established
Limestone	15 mg/m ³ (T); 5 mg/m ³ (R)	Not established	10 mg/m ³ (T); 5 mg/m ³ (R)
Calcium oxide	5 mg/m ³	2 mg/m ³	2 mg/m ³
Magnesium oxide	15 mg/m ³ (T); 5 mg/m ³ (R)	10 mg/m ³	Not established
Nuisance Dusts (PNOR)	15 mg/m ³ (T); 5 mg/m ³ (R)	10 mg/m ³	Not established
Crystalline Silica (Quartz)	10 mg/m ³ (R) /(% SiO ₂ + 2) 30 mg/m ³ (T) /(% SiO ₂ + 2)	0.025 mg/m ³ (R)	0.05 mg/m ³ (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

Physical State	Gray, flowable semi-fluid	Specific Gravity	1.9 – 2.4
Appearance & Color	Grey/off-white paste	Flash Point/Method	None. Not flammable.
Odor	None	Auto Ignition Temperature	Not determined
pH	>12	Lower Flammability Limit	Not applicable
Boiling Point	> 1000 °C (> 1832 °F)	Upper Flammability Limit	Not applicable
Solubility (Water)	Slight (<5%)	Octanol/H₂O Coefficient	Not determined
Evaporation Rate	Not applicable	Viscosity	Varies accord to mixture
Melting Point	Not determined	Freezing Point	Not determined
Vapor Density	Not applicable	Explosion Risk: Static	Not considered a hazard
Vapor Pressure	Not applicable	Explosion Risk: Shock	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.

Hazardous Reactions	None. Hazardous polymerization will not occur.
Conditions to Avoid	Moisture or wetting powder will cause exothermic heating as product cures.
Incompatible Materials	Avoid contact with strong acids, oxidizers, aluminum and ammonium salts.
Decomposition Hazards	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

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

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

Section 13 – Disposal Considerations

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

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

Independent Testing Laboratory CCRL/AMRL* accredited including C1077?

(Circle Yes or No)

*CCRL Lab Listing AMRL Listing Name & Certification #

yes no

ACI Concrete Strength Testing Technician _____

ACI Field Testing Technician(s) _____

ACI Certification can be obtained by contacting the CRMCA at _____

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: _____

Pt. of truck discharge (in accordance with ASTM C94)

(Circle Yes or No)

<input type="checkbox"/> yes	<input type="checkbox"/> no
<input type="checkbox"/> yes	<input type="checkbox"/> no

Pt. of placement (must be specified and comply with OSHA regulations)

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:	<input type="checkbox"/> yes	<input type="checkbox"/> no
Air Content:	<input type="checkbox"/> yes	<input type="checkbox"/> no
Density (unit wt.):	<input type="checkbox"/> yes	<input type="checkbox"/> no
Temperature:	<input type="checkbox"/> yes	<input type="checkbox"/> no

Compressive Strength:	<input type="checkbox"/> yes	<input type="checkbox"/> no
# cylinders per test	_____	
Flexural Strength:	<input type="checkbox"/> yes	<input type="checkbox"/> no
Other: _____	<input type="checkbox"/> yes	<input type="checkbox"/> 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:	<input type="checkbox"/> yes	<input type="checkbox"/> no
Air Content:	<input type="checkbox"/> yes	<input type="checkbox"/> no
W/CM Ratio:	<input type="checkbox"/> yes	<input type="checkbox"/> no

Temperature:	<input type="checkbox"/> yes	<input type="checkbox"/> no
Density (unit wt.)	<input type="checkbox"/> yes	<input type="checkbox"/> no
Time Limit:	<input type="checkbox"/> yes	<input type="checkbox"/> 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)

- Immersed in water-controlled temperature environment (Preferred)
- Storage box-controlled temperature environment
- Exposed to the environment

(Circle Yes or No)

<input type="checkbox"/> yes	<input type="checkbox"/> no
<input type="checkbox"/> yes	<input type="checkbox"/> no
<input type="checkbox"/> yes	<input type="checkbox"/> 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 light 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: _____

Field Curing Method: (Form or Shoring Removal but not Acceptance)

Storage under conditions consistent with concrete in the structure

Maturity

(Circle Yes or No)

<input type="checkbox"/>	yes	<input type="checkbox"/>	no
<input type="checkbox"/>	yes	<input type="checkbox"/>	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 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:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Architect:	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Structural Engineer:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Construction Manager:	<input type="checkbox"/> Yes	<input type="checkbox"/> No
General Contractor:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Concrete Supplier:	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Owners Testing Agency:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Testing Agency:	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Email Address of Attendees:

Owner:	
Architect:	
Structural Engineer:	
Construction Manager:	
General Contractor:	
Concrete Supplier:	
Owners Testing Agency:	
Testing Agency:	

Notes or Comments:
