SUBMITTAL

Kelley Trucking inc.
Earthmoving Contractors
Golden, CO • kelleytruckinginc.com

Submittal number	018.0	Date	02/16/2021
Project	TRAILS AT CROWFOOT F9	6454 N. Crowfoot Valley Road Parker, CO	
Project number	202103		
Spec section			
Subsection		Status	Open
Current action	Submitted	Ball in court	
Topic	Concrete Mix - Hand, Machine		

Submitter	MICHAEL TOMAS SNYDER
Reviewer	
Cc	

Date submitted	02/16/2021	Submission due date	02/16/2021
Released for review	02/16/2021	Review due date	02/23/2021
Date returned		Required on site date	
Date closed			

Notes

Please see attached Thoutt Brothers Concrete Mix submittal for TCF F9.

Submittal includes
-Hand Mix
-Machine Mix

West Central Region Office
1707 Cole Boulevard, Suite 100
Golden, Colorado 80401
Telephone: (303) 985-1070
Facsimile: (303) 716-5318
To Order: 303.744.2378

Project Mix Designs

Date: 2/16/2021

Contractor: Thoutt Brothers
Attention:
Project: Trails At Crowfoot Filing 9
Location:

Mix	Usage	Mix Number	*f 'c*	w/c+p	Slump	Air
1	Hand Mix	7456120.	4500	0.41	3.00 - 5.00"	5.0 - 8.0%
2	Machine	7456122.	4500	0.41	0.50 - 3.00"	5.0 - 8.0%

IF FIBERS OR COLOR ARE REQUIRED IN THE MIX,
IT MUST BE SPECIFIED WHEN ORDERING!

Sales Representative:

Main Plant: 925

ACI 301-10 1.6.4.1.c: Testing agency will report all tests and inspection results to Architect/Engineer, Contractor, and Concrete supplier within seven days after tests and inspections are performed.

Please forward results to:
Aggregate Industries
Attention: Stephen Herald
1705 S. Acoma
Denver, Colorado 80223

AGGREGATE INDUSTRIES
West Central Region

CONCRETE MIX DESIGN SUBMITTAL

Contractor: Thoutt Brothers

Project Name Trails At Crowfoot Filing 9

Mix I.D.: **7456120.**

Qualification: ACI 301-10 4.2.3.2.a

Intended Use: Hand Mix

PROPORTIONS	1	cu.yd. (SSD)	
ASTM C150 Type I-II	526	LBS.	
ASTM C618 Fly Ash	132	LBS.	
ASTM C33 Coarse Aggregate	1738	LBS.	
ASTM C33 Fine Aggregate	1162	LBS.	
ASTM Potable Water	270	LBS.	32.35 gal/cy
ASTM C260 Air Entrainer	0.51	oz/cwt C+P	3.35 oz/cy
ASTM C494 Type A Water Reducer	5.0	oz/cwt C+P	32.90 oz/cy

PHYSICAL PROPERTIES

Slump: 3.00 - 5.00"

Air Content: 5.0 - 8.0%

w/c + p ratio: 0.41

COMPRESSIVE STRENGTH

$f'c$ = 4,500 psi @ 28 days

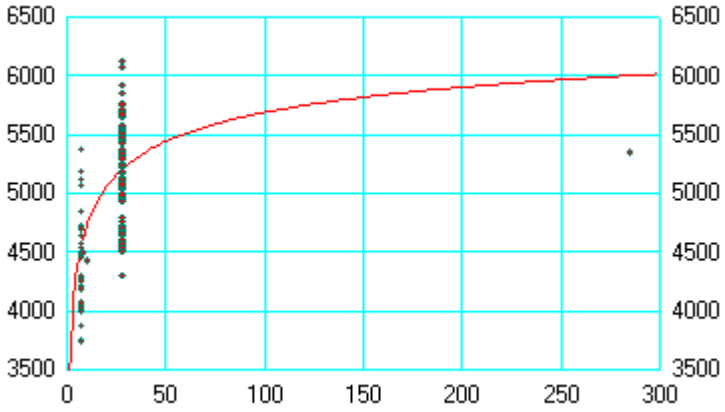
Production and delivery in accordance with ASTM C 94 Standard Specification for Ready-Mixed Concrete. Compressive strength performance is conditional with strict adherence to the current ASTM Standards relating to concrete, and the latest revisions of ACI 301 and 318.

Please direct inquiries to:
Stephen Herald
Quality Control Manager, Concrete
Phone: 303-777-3052
Fax: 303-744-2062
stephen.herald@aggregate-us.com

Date: 2/16/2021

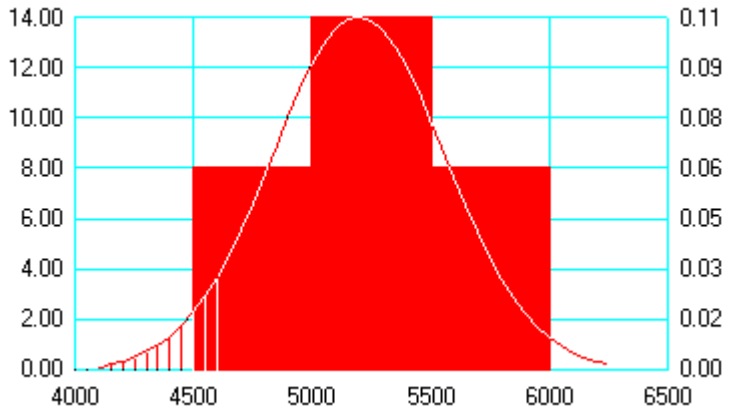
Units : US

PSI **Strength and Strength Fit vs Maturity** **PSI**



Maturity Days

# of Occ. **Histogram for 28 Day Strength** **%/PSI**



PSI

95% of tests lie above cross-hatched area

Mix Name: 7456120. Mix Strength: 4,500 PSI at 28.0 Days

STRENGTH SUMMARY, Compression Either 4" x 8" Or 6" x 12" Strengths

No. Of Tests	Avg Slump	Avg Air	Avg 7 Day	Avg 28 Day	Avg Acc Age	Accept Age	Std Dev	ACI318 Req'd
30	4.04	6.19	4450	5200	5200	28	370	5000

DETAILED STRENGTH, Compression Either 4" x 8" Or 6" x 12"

Batch Number	Date	Slump	Air	Strengths 7 Day	28 Day	Acc Age	Acc Age
88393556	9/23/2020	4.25	8.00	4010	4870	4870	28
62302822	9/24/2020	4.00	6.00	4570	5230	5230	28
62302832	9/24/2020	4.50	7.00	3760	4540	4540	28
62302815	9/24/2020	3.75	6.50	4690	5070	5070	28
62302889	9/25/2020	4.25	5.80	4540	5240	5240	28
62302878	9/25/2020	4.00	5.50	4640	5530	5530	28
62303020	9/28/2020	4.25	6.50	4220	5250	5250	28
88314075	9/30/2020	4.50	5.00	4460	5320	5320	28
62303134	9/30/2020	3.25	5.50	4190	4980	4980	28
59595903	9/30/2020	3.25	5.10	4700	5420	5420	28
88314134	10/1/2020	4.75	5.50	4500	5200	5200	28
75960098	10/7/2020	3.50	5.60	3740	4620	4620	28
62303499	10/8/2020	4.00	6.00	4490	4790	4790	28
75960283	10/9/2020	4.00	7.00	4010	4620	4620	28
62303565	10/9/2020	4.00	6.20	4000	4710	4710	28
62303663	10/12/2020	4.00	8.00	3880	5050	5050	28

DETAILED STRENGTH, Compression Either 4" x 8" Or 6" x 12"

Batch Number	Date	Slump	Air	Strengths 7 Day	28 Day	Acc Age	Acc Age
59596567	10/12/2020	4.50	5.90		5190	5190	28
75960536	10/13/2020	4.50	5.90	4720	5430	5430	28
59596638	10/13/2020	4.00	5.20	4040	5020	5020	28
88314787	10/16/2020	4.50	5.60		5500	5500	28
88394500	10/21/2020	4.50	7.50	4290	5420	5420	28
88394562	10/22/2020	3.75	5.30	5070	5760	5760	28
88394810	10/29/2020	4.00	6.20	4540	5170	5170	28
62304555	10/30/2020	3.58	6.50	4260	5680	5680	28
88394954	11/2/2020	4.50	5.60	5120	5730	5730	28
88395059	11/3/2020	4.00	6.40	4850	5660	5660	28
62304704	11/3/2020	4.00	7.00	4700	5520	5520	28
62304757	11/4/2020	4.00	7.80	5190	4610	4610	28
75961554	11/5/2020	3.50	6.00	4070	5050	5050	28
88397059	12/21/2020	3.75	5.50	5380	5720	5720	28

AGGREGATE INDUSTRIES
West Central Region

CONCRETE MIX DESIGN SUBMITTAL

Contractor: Thoutt Brothers

Project Name Trails At Crowfoot Filing 9

Mix I.D.: **7456122.**

Qualification: ACI 301-10 4.2.3.2.a

Intended Use: Machine

PROPORTIONS			
	1	cu.yd. (SSD)	
ASTM C150 Type I-II	528	LBS.	
ASTM C618 Fly Ash	132	LBS.	
ASTM C33 Coarse Aggregate	1720	LBS.	
ASTM C33 Fine Aggregate	1207	LBS.	
ASTM Potable Water	269	LBS.	32.23 gal/cy
ASTM C260 Air Entrainer	1.85	oz/cwt C+P	12.23 oz/cy
ASTM C494 Type A Water Reducer	4.0	oz/cwt C+P	26.40 oz/cy

PHYSICAL PROPERTIES

Slump:	0.50 - 3.00"
Air Content:	5.0 - 8.0%
w/c + p ratio:	0.41

COMPRESSIVE STRENGTH

$f'c$ = 4,500 psi @ 28 days

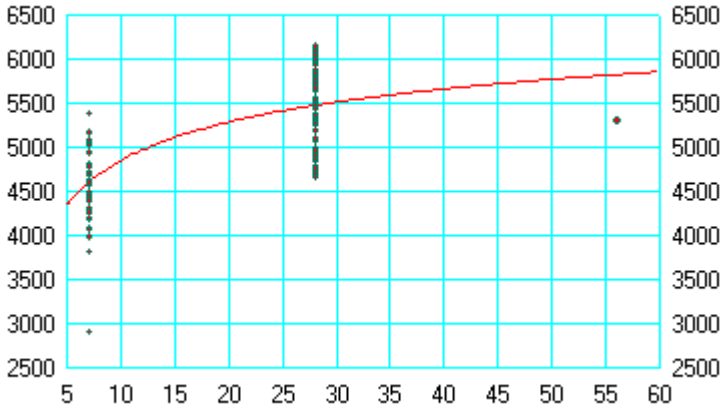
Production and delivery in accordance with ASTM C 94 Standard Specification for Ready-Mixed Concrete. Compressive strength performance is conditional with strict adherence to the current ASTM Standards relating to concrete, and the latest revisions of ACI 301 and 318.

Please direct inquiries to:
Stephen Herald
Quality Control Manager, Concrete
Phone: 303-777-3052
Fax: 303-744-2062
stephen.herald@aggregate-us.com

Date: 2/16/2021

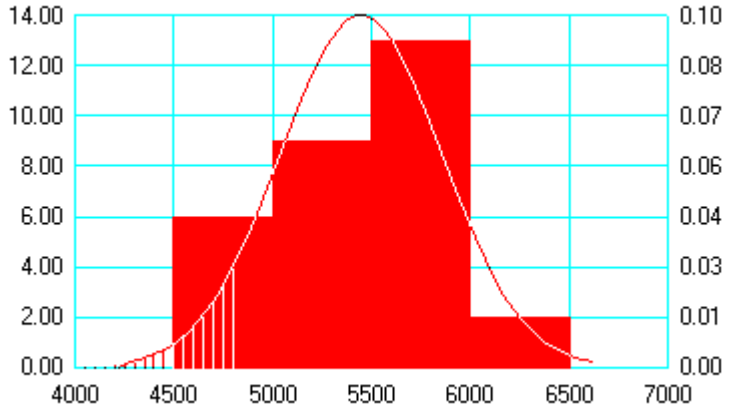
Units : US

PSI **Strength and Strength Fit vs Maturity** **PSI**



Maturity Days

# of Occ. **Histogram for 28 Day Strength** **%/PSI**



PSI

95% of tests lie above cross-hatched area

Mix Name: 7456122. Mix Strength: 4,500 PSI at 28.0 Days

STRENGTH SUMMARY, Compression Either 4" x 8" Or 6" x 12" Strengths

No. Of Tests	Avg Slump	Avg Air	Avg 7 Day	Avg 28 Day	Avg Acc Age	Accept Age	Std Dev	ACI318 Req'd
30	3.29	5.73	4520	5450	5450	28	410	5050

DETAILED STRENGTH, Compression Either 4" x 8" Or 6" x 12"

Batch Number	Date	Slump	Air	Strengths 7 Day	28 Day	Acc Age	Acc Age
88310306	6/4/2020	3.75	7.10	4080	4820	4820	28
88310526	6/12/2020	3.50	5.50	4390	5190	5190	28
88310968	6/25/2020	3.50	6.00	4720	5770	5770	28
64984980	6/25/2020	3.75	6.40	5210	5910	5910	28
59592503	7/9/2020	3.25	5.90	5060	5800	5800	28
67656158	7/22/2020	3.50	5.50		5540	5540	28
86198256	7/30/2020	3.75	6.40	4940	5730	5730	28
64986163	8/3/2020	3.50	6.20	4610	5700	5700	28
67656756	8/4/2020	3.00	5.00	4300	5430	5430	28
75958095	8/6/2020	3.00	7.00	2910	4870	4870	28
88312412	8/12/2020	3.25	5.00	4470	5770	5770	28
49175932	8/20/2020	3.25	6.20	3820	5000	5000	28
88392835	9/14/2020	3.00	5.50	4600	4920	4920	28
88313567	9/16/2020	3.75	5.40	4820	5920	5920	28
62302815	9/24/2020	3.75	6.50	4690	5070	5070	28
62303134	9/30/2020	3.25	5.50	4190	4980	4980	28

DETAILED STRENGTH, Compression Either 4" x 8" Or 6" x 12"

Batch Number	Date	Slump	Air	Strengths 7 Day	28 Day	Acc Age	Acc Age
59595903	9/30/2020	3.25	5.10	4700	5420	5420	28
75959950	10/5/2020	3.50	4.50	4310	5390	5390	28
75960076	10/7/2020	3.75	5.60	5030	5900	5900	28
75960158	10/8/2020	2.50	4.30	4400	5180	5180	28
62418826	10/15/2020	3.00	5.00	3990	4930	4930	28
59596909	10/19/2020	2.50	5.10	4310	4780	4780	28
88394562	10/22/2020	3.75	5.30	5070	5760	5760	28
62304462	10/29/2020	3.00	5.50	4780	5880	5880	28
62304555	10/30/2020	3.58	6.50	4260	5680	5680	28
75961554	11/5/2020	3.50	6.00	4070	5050	5050	28
88395718	11/16/2020	3.75	4.50	4200	5250	5250	28
88396734	12/10/2020	2.00	7.20	4780	6010	6010	28
88397059	12/21/2020	3.75	5.50	5380	5720	5720	28
74023461	1/6/2021	2.00	6.60	5130	6040	6040	28

Material Certification Report

Material: Portland Cement
Type: I-II

Test Period: 01-Oct-2020 to 31-Oct-2020
Date Issued: 13-Nov-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 [1]**	**Result**	**Item**	**Limit [1]**	**Result**
SiO_2 (%)	-	20.0	Air Content (%)	12 max	7
Al_2O_3 (%)	6.0 max	4.5	Blaine Fineness (m^2/kg)	260 min	425
Fe_2O_3 (%)	6.0 max	3.3			
CaO (%)	-	64.1	Autoclave Expansion (%) (C151)	0.80 max	0.00
MgO (%)	6.0 max	1.3	Compressive Strength MPa (psi)		
SO_3 (%) [2]	3.0 max	3.6	1 day	-	22.2 (3220)
Loss on Ignition (%) [5]	3.5 max	2.6	3 day	10.0 (1450) min	33.9 (4920)
Insoluble Residue (%)	1.50 max	0.80	7 day	17.0 (2470) min	39.1 (5670)
CO_2 (%)	-	1.6	28 day (previous month's data)	-	47.5 (6890)
$CaCO_3$ in Limestone (%)	70 min	84			
Potential Phase Compositions [3]:			Initial Vicat (minutes)	45-375	106
C_3S (%)	-	60			
C_2S (%)	-	11	Mortar Bar Expansion (%) (C1038)	0.020 max	0.013
C_3A (%)	8 max	6			
C_4AF (%)	-	10			
$C_3S + 4.75C_3A$ (%)	-	89			

Test Data on ASTM Optional Requirements

Chemical			Physical		
Item	**Limit [1]**	**Result**	**Item**	**Limit [1]**	**Result**
Cl (%)	-	0.02	False Set, Final Penetration (%)	50 min	76
Equivalent Alkalies (%)	-	0.73	Heat of Hydration kJ/kg (cal/g) (ASTM C1702) 3 Days [4]	-	297 (71)

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

Additional Data

Item	Limestone	Inorganic Processing Addition	Base Cement Phase Composition	Result
Amount (%)	4.2	-	C_3S (%)	63
SiO_2 (%)	11.0	-	C_2S (%)	11
Al_2O_3 (%)	3.7	-	C_3A (%)	6
Fe_2O_3 (%)	1.3	-	C_4AF (%)	10
CaO (%)	46.1	-		
SO_3 (%)	0.5	-		

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Version: 180412

Tessa McCreight,
Quality Manager

Materials Testing & Research Facility
2650 Old State Hwy 113
Taylorsville, GA 30178
770-684-0102

ASTM C618 / AASHTO M295 Testing of Prairie State Fly Ash

Sample Date: 9/1 - 9/30/20
Report Date: 11/11/2020
Sample Type: Monthly
MTRF ID: 2062PS
Sample ID: MnDOT Split

Chemical Analysis	Results		ASTM Limit Class F / C	AASHTO Limit Class F / C
Silicon Dioxide (SiO2)	54.30	%		
Aluminum Oxide (Al2O3)	17.57	%		
Iron Oxide (Fe2O3)	11.34	%		
Sum (SiO2+Al2O3+Fe2O3)	83.21	%	50.0 min	50.0 min
Sulfur Trioxide (SO3)	1.15	%	5.0 max	5.0 max
Calcium Oxide (CaO)	8.00	%	18.0 max / >18.0	18.0 max / >18.0
Magnesium Oxide (MgO)	1.45	%		
Sodium Oxide (Na2O)	1.24	%		
Potassium Oxide (K2O)	2.57	%		
Sodium Oxide Equivalent (Na2O+0.658K2O)	2.93	%		
Moisture	0.03	%	3.0 max	3.0 max
Loss on Ignition	1.10	%	6.0 max	5.0 max
Available Alkalies, as Na2Oe	0.79	%	Not Required	1.5 max*
				when required by purchaser
Physical Analysis				
Fineness, % retained on 45-µm sieve	25.13	%	34 max	34 max
Fineness Uniformity	1.59	%	±5 max	±5 max
Strength Activity Index - 7 or 28 day requirement				
7 day, % of control	81	%	75 min	75 min
28 day, % of control	87	%	75 min	75 min
Water Requirement, % control	96	%	105 max	105 max
Autoclave Soundness	-0.01	%	0.8 max	0.8 max
Density	2.36	g/cm3		
Density Uniformity	1.35	%	±5 max	±5 max

Christy Sieg
Lab Manager

AASHTO ACCREDITED

WesTest

627 Sheridan Boulevard • Lakewood, CO 80214
P: 303.975.9959 •F: 303.975.9969
office@westest.net•www.westest.net

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:

COLORADO LICENSED DYLAN A. HULLINGER 49996 1/23/20 PROFESSIONAL ENGINEER

Dylan A. Hullinger, P.E.

AASHTO ACCREDITED

LABORATORY TEST REPORT

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

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

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

MATERIAL DESCRIPTION	ASTM & AASHTO Size No. 57/67 Coarse Aggregate
DATE SAMPLED	January 2, 2020
SAMPLE LOCATION	Stockpile

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

ASTM C117 & C136, AASHTO T 11 & T 27

SIEVE SIZE	% Passing	Size No. 57 Specification	Size No. 67 Specification
1-1/2"	100	100	
1"	100	95 - 100	100
3/4"	91		90 - 100
1/2"	56	25 - 60	
3/8"	34		20 - 55
# 4	3	0 - 10	0 - 10
# 8	2	0 - 5	0 - 5
# 16	1		
# 30	1		
# 50	1		
# 100	1		
# 200	1.0	0 - 1.5	0 - 1.5

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

SAMPLE WT. (g)	LIQUID TYPE / SPECIFIC GRAVITY	LIGHTWEIGHT PARTICLES	SPEC.
5046.1	$ZnCl_2$/2.0	0.0%	0.5% Max.
5046.1	$ZnBr_2$/2.4	0.0%	3.0% Max.

ASTM C88, AASHTO T 104, Sodium Sulfate Soundness, 5 Cycles

SIEVE SIZE	GRADING OF ORIGINAL SAMPLE	WEIGHT BEFORE TEST, g	PERCENT PASSING AFTER TEST	WEIGHTED PERCENT LOSS
1-1/2" to 1"	9		0.6	0.1
1" to 3/4"		509.9		
3/4" to 1/2"	59	669.1	6.1	3.6
1/2" to 3/8"		331.0		
3/8" to No.4	32	301.8	8.4	2.7
TOTAL	100	COARSE AGG. TOTAL 97%		6
SPECIFICATION:				12 Max.

ASTM C29, AASHTO T 19, Bulk Density and Voids in Aggregate

Rodding Method; Bulk Density = 101 pcf

Voids in Aggregate = 38%

Sum of Clay Lumps, Friable Particles, Chert = 0.1%

Specification: 3.0% Max.

ASTM D4791, Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate, Ratio 5:1

SAMPLE WT. (g)	FLAT (%)	ELONGATED (%)	FLAT AND ELONGATED (%)	TOTAL (%)
5009.0	0	0	0	0

TABLE 1

WesTest

627 Sheridan Boulevard • Lakewood, CO 80214
P: 303.975.9959 • F: 303.975.9969
office@westest.net • www.westest.net

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:

Test Expansion	Classification	Potential for Deleterious ASR
< 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

COLORADO LICENSED DYLAN A. HULLINGER 49996 1/24/20 PROFESSIONAL ENGINEER

Reviewed by:

Dylan A. Hullinger, P.E.

AASHTO ACCREDITED

WesTest
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

	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	
Specimen	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%

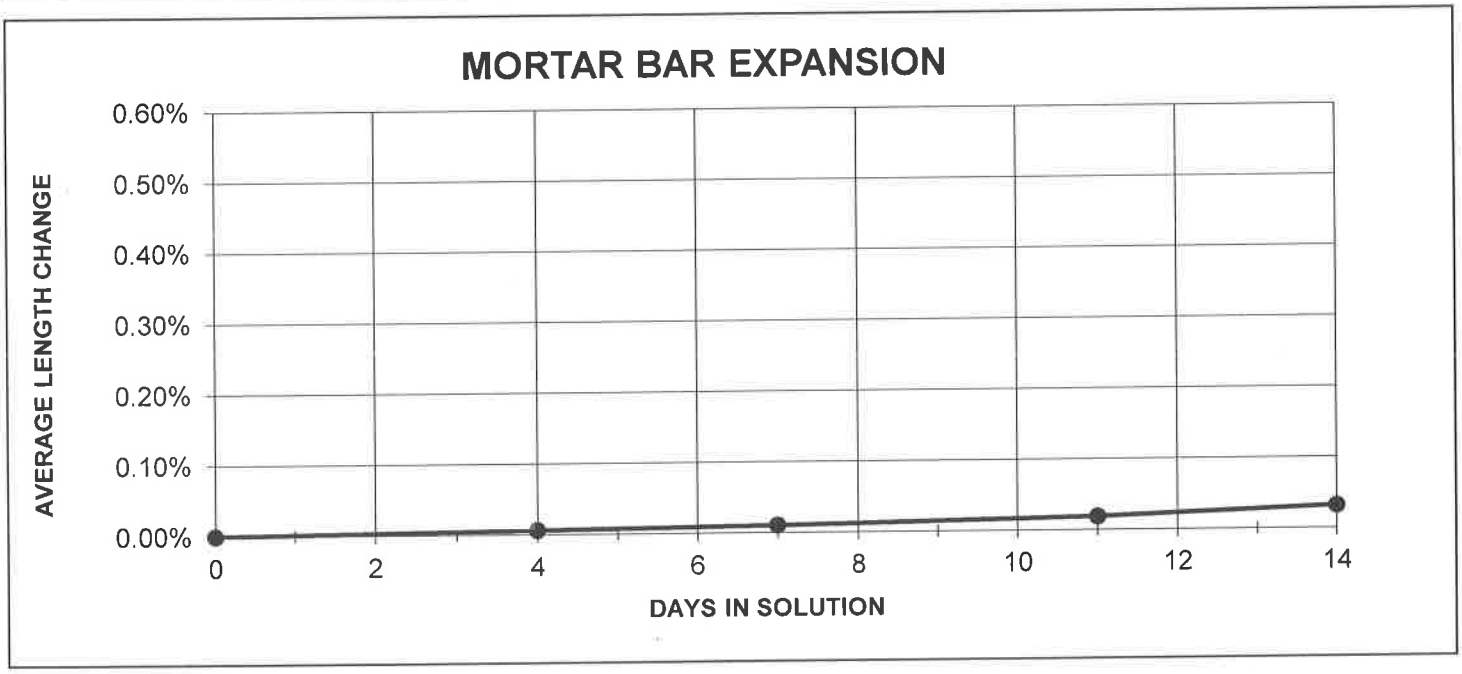

FIGURE 1

WesTest

627 Sheridan Boulevard • Lakewood, CO 80214
P: 303.975.9959 • F: 303.975.9969
office@westest.net • www.westest.net

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
WesTest 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,
WesTest

Quyen T. Liu, EIT

COLORADO LICENSED
DYLAN A HULLINGER
49996
1/30/20
PROFESSIONAL ENGINEER

Reviewed by:

Dylan A. Hullinger, P.E.

AASHTO ACCREDITED

LABORATORY TEST REPORT

WesTest
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

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)

ASTM C117 & C136, AASHTO T 11 & T 27

SIEVE SIZE	% Passing	ASTM C33 Spec.	AASHTO M 6 Spec.
1"			
3/4"			
1/2"			
3/8"	100	100	100
# 4	100	95 - 100	95 - 100
# 8	89	80 - 100	80 - 100
# 16	60	50 - 85	50 - 85
# 30	35	25 - 60	25 - 60
# 50	13	5 - 30	10 - 30
# 100	4	0 - 10	2 - 10
# 200	1.2	0 - 3.0	0 - 2.0
Fineness Modulus	2.99	2.3 - 3.1	2.3 - 3.1

ASTM C128, AASHTO T 84,
Bulk Specific Gravity = 2.596, Bulk Specific Gravity (SSD) = 2.616, Apparent Specific Gravity = 2.655, Absorption = 0.8%

ASTM D2419, AASHTO T 176,
Sand Equivalent Value = 98
Specification: 80 Min. (CDOT)

ASTM C142, AASHTO T 112,
Clay Lumps & Friable Particles
FINE AGG. = 0.0%, Specification: 3.0% Max.

ASTM C123, AASHTO T 113,
Lightweight Particles in Aggregate

SAMPLE WT.	LIQUID TYPE / SPECIFIC GRAVITY	LIGHTWEIGHT PARTICLES	SPEC.
279.0	$ZnCl_2$/2.0	0.0%	0.25% Max.
279.0	$ZnBr_2$/2.4	0.6%	3.0% Max.

ASTM C88, AASHTO T 104, Sodium Sulfate Soundness, 5 Cycles

SIEVE SIZE	GRADING OF ORIGINAL SAMPLE	WEIGHT BEFORE TEST, g	PERCENT PASSING AFTER TEST	WEIGHTED PERCENT LOSS
Minus #100	4			
# 50 to # 100	9			
# 30 to # 50	22	100.1	9.2	2.0
# 16 to # 30	25	100.1	4.0	1.0
# 8 to # 16	29	100.0	1.8	0.5
# 4 to # 8	11	100.0	2.8	0.3
3/8" to # 4	0			
TOTAL	100	FINE AGG. TOTAL 100%		4
SPECIFICATION:				10 Max.

ASTM C40, AASHTO T 21, Organic Impurities:
Less than Organic Plate No. 1
Specification: Organic Plate No. 3 or Less

ASTM C29, AASHTO T 19,
Bulk Density and Voids in Aggregate

Rodding Method; Bulk Density = 106 pcf

Voids in Aggregate = 34%

COMMENTS:

TABLE 1

WesTest

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

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:

Test Expansion	Classification	Potential for Deleterious ASR
< 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

Quyen T. Liu, EIT

Reviewed by:

COLORADO LICENSED DYLAN A. HULLINGER 49996 2/3/20 PROFESSIONAL ENGINEER

Dylan A. Hullinger, P.E.

AASHTO ACCREDITED

WESTEST
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

	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	
Specimen	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%

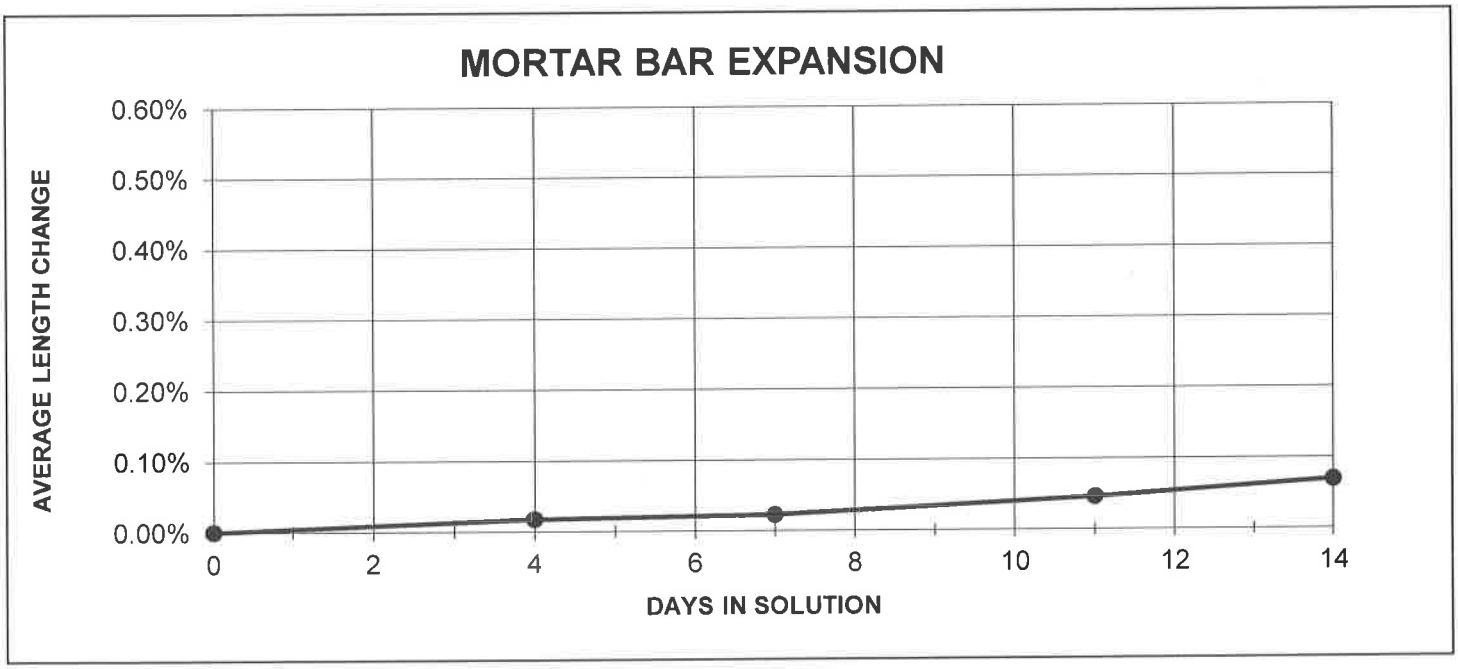

FIGURE 1

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

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 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 MERCHANTIBILITY 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

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 - PLASTOCRETE 161 March 5, 2020

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 MERCHANTIBILITY 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

BUILDING TRUST

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

Mr. Stephen Herald
Aggregate Industries

CONTACT

Nathaniel Artman
Concrete Specialist
Phone: +1.330.495.0109
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.

Respectfully,

Nathaniel Artman, EI
Concrete Specialist

AGGREGATE INDUSTRIES

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/m3 (T); 5 mg/m3 (R)	1 mg/m3 (R)	10 mg/m3 (T); 5 mg/m3 (R)
Calcium hydroxide	5 mg/m3	5 mg/m3	5 mg/m3
Fly ash	15 mg/m3 (T); 5 mg/m3 (R)	10 mg/m3 (T); 3 mg/m3 (R)	Not established
Limestone	15 mg/m3 (T); 5 mg/m3 (R)	Not established	10 mg/m3 (T); 5 mg/m3 (R)
Calcium oxide	5 mg/m3	2 mg/m3	2 mg/m3
Magnesium oxide	15 mg/m3 (T); 5 mg/m3 (R)	10 mg/m3	Not established
Nuisance Dusts (PNOR)	15 mg/m3 (T); 5 mg/m3 (R)	10 mg/m3	Not established
Crystalline Silica (Quartz)	10 mg/m3 (R) /(% SiO2 + 2) 30 mg/m3 (T) /(% SiO2 + 2)	0.025 mg/m3 (R)	0.05 mg/m3 (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 Avoid contact with skin or eyes. Avoid creating or breathing dust.

Face and Eyes 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 ilsted
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) 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 _____

ACI Certifcation 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

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: _____

Field Curing Method: (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.

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: