



WEAVER CONSTRUCTION MANAGEMENT, INC.  
3679 S. Huron St., Suite 404  
Englewood, CO 80110  
Phone: (303) 789-4111 FAX: (303) 789-4310

## SUBMITTAL TRANSMITTAL

August 17, 2011

WCM Submittal No: 03300-017

PROJECT: Harold Thompson Regional WRF  
Birdsall Rd.  
Fountain, CO 80817  
Job No. 2908

ENGINEER: GMS, Inc.  
611 No. Weber St., #300  
Colorado Springs, CO 80903  
719-475-2935 Roger Sams

OWNER: Lower Fountain Metropolitan  
Sewage Disposal District  
901 S. Santa Fe Ave.  
Fountain, CO 80817  
719-382-5303 James Heckman

CONTRACTOR: Weaver Construction Management

SUBJECT: Concrete Mix Design 3750psi - Drilled Piers for Equipment Maintenance Building

SPEC SECTION: 03300 - Cast-In-Place Concrete

PREVIOUS SUBMISSION DATES: n/a

DEVIATIONS FROM SPEC: \_\_\_ YES X NO

CONTRACTOR'S STAMP: This submittal has been reviewed by Weaver General Construction and approved with respect to the means, methods, techniques, & safety precautions & programs incidental thereto. Weaver General Construction also warrants that this submittal complies with contracted documents and comprises on deviations thereto:

Contractor's Stamp:

Engineer's Stamp:

Date: 8/17/11  
Reviewed by: H.C. Myers  
( X ) Reviewed Without Comments  
( ) Reviewed With Comments

ENGINEER'S  
COMMENTS:

# TRANSIT MIX CONCRETE CO.

**Colorado Springs**                      **Pueblo**  
P.O. Box-1030, CO 80901              P.O. Box-857, CO 81002  
(719) 475-0700 (Fax) 475-0226        (719) 561-8350 (Fax) 566-0231

## CONCRETE MIX DESIGN

August 16, 2011

HDT RFP BP1 Equipment Maintenance Building  
Birdsall Road East of Old Pueblo Road  
Fountain, Colorado

"Drilled Piers-Flowable Concrete Mixture"  
3750 PSI @ 28 Days • 5" -7" Slump • 0.48 Maximum W/CM

### WEAVER GENERAL CONSTRUCTION

3679 S Huron St. – Suite-404

Englewood, Colorado 80110

		<u>ONE CUBIC YARD</u>
Cement	( Holcim Type I/II )	480 lbs
Fly Ash	( Boral Class F )	84 lbs
AEA	( Master Builders AE-90 )	5.2 oz
WRA	( Master Builders 200N )	16.9 oz
HRWRA	( Master Builders 1020 )	39.5 oz
Sand	( Daniels Sand Co. )	1315 lbs
Rock	( Castle Concrete No. 57/67 )	1710 lbs
Water		254 lbs

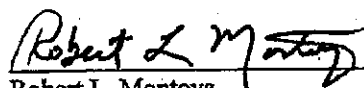
### Transit Mix Concrete CO Identification Number: 44002110

#### Approximate Physical Properties:

Unit Weight - pcf	± 140.8
Slump - Inches	5" - 7"
Air Content - %	6% ± 1.0%
Water / Cementitious Ratio	0.45

This mix is derived from the enclosed "Summary of Concrete Mix Data" series (Table No.104-4). Compliance information on the various materials is also enclosed. Production and delivery is 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.

TRANSIT MIX CONCRETE CO.



Robert L. Montoya  
Technical Service Manager

**J. B. Morgan, P. E., C.C.E.**

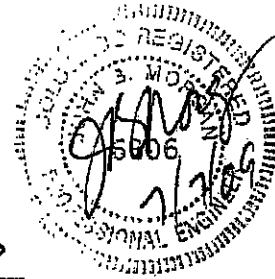
CONSULTING STRUCTURAL ENGINEER

**Summary of Concrete Mix Data**

Table NO. 104-4 (Air Entrained Flowable Concrete w/ 15% Fly Ash @ 5" - 7" Slump)

Client: Transit Mix Concrete CO  
Project: Plant Mixes  
Aggregates: ASTM C 33 Coarse and Fine  
Cement: ASTM C 150 Type I-II  
Fly Ash: ASTM C 618 Class F  
Admixtures: ASTM C 494-WRA and HRWRA, ASTM C 260-AE

44002110



<u>MIX PROPORTIONS</u>	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
Cement (Type I-II), lbs.	321	360	400	439	480	519	559	599
Fly Ash (Class F), lbs.	55	63	70	78	84	92	99	106
Total Cementitious, lbs	376	423	470	517	564	611	658	705
Air Entrainer, oz.	3.1	3.6	4.1	4.5	5.2	5.6	6.1	6.4
Water Reducer, oz.	11.3	12.7	14.1	15.5	16.9	18.3	19.7	21.2
High Range Water Reducer, oz.	22.6	25.4	28.2	36.2	39.5	42.8	46.1	49.4
Fine Aggregate, lbs.	1470	1430	1390	1350	1315	1275	1235	1195
# 57/67 Coarse Aggregate, lbs.	1710	1710	1710	1710	1710	1710	1710	1710
Water, gallons	31.5	31.5	31.5	31.0	30.5	31.5	31.9	32.9
Water, lbs.	262.4	262.4	262.4	258.2	254.1	262.4	265.7	274.1
<u>PHYSICAL PROPERTIES</u>								
Wet Unit WT. (PCF)	139.6	139.9	140.1	140.6	140.8	141.2	141.4	141.7
Slump (Inches)	7.00	6.50	6.00	6.00	6.25	6.50	6.50	6.00
Air Content, %	5.2	5.4	5.2	5.4	5.6	5.8	5.9	5.5
Water Cement Ratio	0.70	0.62	0.56	0.50	0.45	0.43	0.40	0.39
Temperature, (°F)	72	72	74	76	77	78	79	80
<u>COMPRESSIVE STRENGTH</u>								
3 Day Average	1690	2140	2590	3200	3890	4370	4490	4710
7 Day Average	2200	2750	3650	4150	4610	4980	5250	5600
28 Day Average	3000	3510	4020	4740	5720	6300	6670	7140

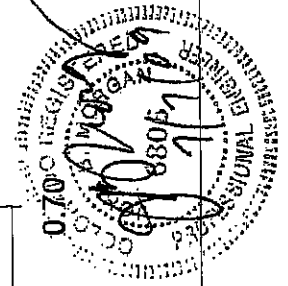
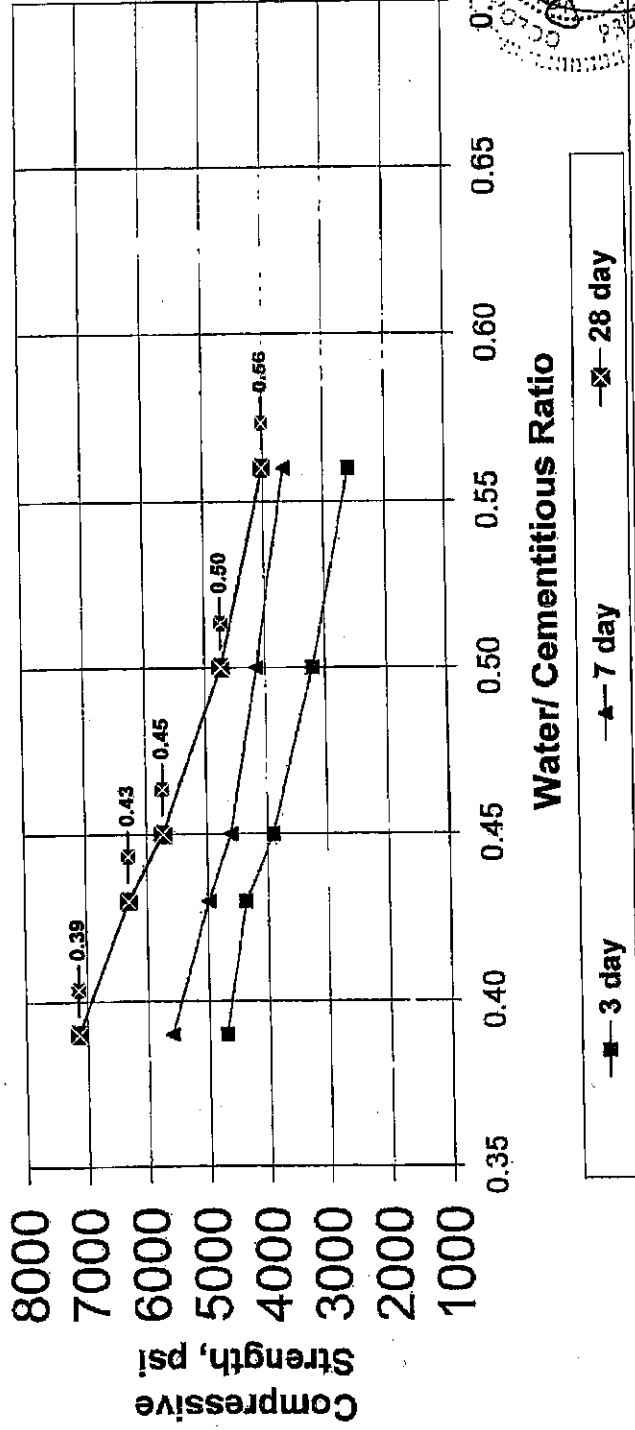
Date Tested: Tuesday, March 24, 2009

400 South 7th Street, Raton, New Mexico 87740

Phone: (505) 4456873885-0903 • Mobile: (719) 332-4557 • Fax: (575) 445-7055

**Transit Mix Concrete Company  
Table NO. 104-4**

**Compressive Strength  
vs.  
Water Cementitious Ratio**



# Material Certification Report

**Material:** Portland Cement  
**Type:** I-II(MH) (ASTM C 150)

**Test Period:** 01-Feb-2011  
**To:** 28-Feb-2011

## Certification

Holcim cement meets the specifications of ASTM C 150 for Type I-II(MH) cement.

## General Information

**Supplier:** Holcim (US) Inc.  
**Address:** 3500 State Highway 120  
 Florence, Co. 81226  
**Telephone:** 719-784-1307  
**Date Issued:** 11-Mar-2011

**Source Location:** Portland Plant  
 3500 State Highway 120  
 Florence, Co. 81226  
**Contact:** Dick Roush

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

## Tests Data on ASTM Standard Requirements

Chemical			Physical		
Item	Limit <sup>A</sup>	Result	Item	Limit <sup>A</sup>	Result
SiO <sub>2</sub> (%)	-	19.5	Air Content (%)	12 max	8
Al <sub>2</sub> O <sub>3</sub> (%)	6.0 max	4.7	Blaine Fineness (m <sup>2</sup> /kg)	280 min 430 max	406
Fe <sub>2</sub> O <sub>3</sub> (%)	6.0 max	3.3			
CaO (%)	-	63.2	Autoclave Expansion (%) (C 151)	0.80 max	-0.01
MgO (%)	8.0 max	1.5	Compressive Strength (MPa (psi):		
SO <sub>3</sub> (%) <sup>C</sup>	3.0 max	3.5			
Loss on Ignition (%)	3.0 max	2.3	3 days	10.0 (1450) min	31.0 (4500)
Insoluble Residue (%)	0.75 max	0.32	7 days	17.0 (2470) min	36.6 (5310)
CO <sub>2</sub> (%)	-	1.2			
Limestone (%)	5.0 max	3.3	Initial Vicat (minutes)	45-375	123
CaCO <sub>3</sub> in Limestone (%)	70 min	83			
Inorganic Processing Addition	5.0 max	0.0	Mortar Bar Expansion (%) (C 1038)		0.010
Potential Phase Compositions <sup>D</sup> :					
C <sub>3</sub> S (%)	-	59			
C <sub>2</sub> S (%)	-	11			
C <sub>3</sub> A (%)	8 max	7			
C <sub>4</sub> AF (%)	-	10			
C <sub>3</sub> S + 4.75C <sub>3</sub> A (%)	100 max	92			

## Tests Data on ASTM Optional Requirements

Chemical			Physical		
Item	Limit <sup>A</sup>	Result	Item	Limit <sup>B</sup>	Result
Equivalent Alkalies (%)		0.70	Heat of Hydration: 7 days, kJ/kg (cal/g) <sup>B</sup>		354 (85)

## Notes

<sup>A</sup> Dashes in the limit / result columns mean Not Applicable.

<sup>B</sup> Test result represents most recent value and is provided for information only. Analysis of Heat of Hydration has been carried out by CTL Group, Skokie, IL.

<sup>C</sup> It is permissible to exceed the specification limit provided ASTM C 1038 Mortar Bar Expansion does not exceed 0.020 %.

<sup>D</sup> Adjusted per Annex A1.6 of ASTM C150 and AASHTO M85.

This data may have been reported on previous mill certificates. It is typical of the cement being currently shipped.



The Chemical Company

January 27, 2011

Transit Mix Concrete CO  
444 East Costilla  
Colorado Springs, Colorado 80903

Attention: Robert Montoya  
Project: Various  
Project location: Various

Certificate of Conformance  
MB-AE™ 90  
BASF Construction Chemicals, LLC\* Air-Entraining Admixture for Concrete

\*(successor in interest to BASF Construction Chemicals, LLC, which is successor by merger to BASF Admixtures, Inc., formerly known as Degussa Admixtures, Inc., formerly known as Master Builders, Inc.)

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:

That MB-AE 90 is a BASF Corporation Air-Entraining Admixture for concrete; and

That no calcium chloride or chloride based ingredient is used in the manufacture of MB-AE 90; and

That MB-AE 90, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.000068 percent (0.68 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That MB-AE 90 meets the requirements of ASTM C 260, Corps of Engineers' CRD-C 13 and AASHTO M154, the Standard Specifications for Air-Entraining Admixtures for Concrete.

Richard Hubbard  
Sr. Technical Marketing Specialist, BASF Corporation

BASF Corporation  
23700 Chagrin Boulevard  
Cleveland, OH 44122  
216 839-7500 ph  
www.masterbuilders.com

**Master  
Builders**  
Admixture Solutions



The Chemical Company

January 27, 2011

Transit Mix Concrete CO  
444 East Costilla  
Colorado Springs, Colorado 80903

Attention: Robert Montoya  
Project: Various  
Project location: Various

Certificate of Conformance  
Pozzolith® 200 N  
BASF Corporation\* Admixture for Concrete

\*(successor in interest to BASF Construction Chemicals, LLC, which is successor by merger to BASF Admixtures, Inc., formerly known as Degussa Admixtures, Inc., formerly known as Master Builders, Inc.)

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:

That Pozzolith 200 N is a BASF Corporation Water-Reducing Admixture for concrete; and

That no calcium chloride or chloride based ingredient is used in the manufacture of Pozzolith 200 N; and

That Pozzolith 200 N, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00013 percent (1.3 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That, depending on the dosage used, Pozzolith 200 N meets the requirements for a Type A, Water-Reducing, Type B, Retarding, and Type D, Water Reducing and Retarding Admixture as specified in ASTM C 494, Corps of Engineers' CRD-C 87 and AASHTO M194, the Standard Specifications for Chemical Admixtures for Concrete.

Richard Hubbard  
Sr. Technical Marketing Specialist, BASF Corporation

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23700 Chagrin Boulevard  
Cleveland, OH 44122  
216 838-7500 ph  
www.masterbuilders.com

**Master  
Builders**  
Admixture Solutions



The Chemical Company

January 27, 2011

Transit Mix Concrete CO  
444 East Costilla  
Colorado Springs, Colorado 80903

Attention: Robert Montoya  
Project: Various  
Project location: Various

Certificate of Conformance  
PolyHeed® 1020  
BASF Corporation\* Admixture for Concrete

\*(successor in interest to BASF Construction Chemicals, LLC, which is successor by merger to BASF Admixtures, Inc., formerly known as Degussa Admixtures, Inc., formerly known as Master Builders, Inc.)

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:

That PolyHeed 1020 is a BASF Corporation Mid-Range Water-Reducing Admixture for concrete; and

That no calcium chloride or chloride based ingredient is used in the manufacture of PolyHeed 1020; and

That PolyHeed 1020, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00014 percent (1.4 ppm) chloride ions by weight of the cement when used at the rate of 85 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That, depending on the dosage used, PolyHeed 1020 meets the requirements for a Type A, Water-Reducing and Type F, Water-Reducing, High Range Admixture specified in ASTM C 494, Corps of Engineers' CRD-C 87 and AASHTO M194, the Standard Specifications for Chemical Admixtures for Concrete.

Richard Hubbard  
Sr. Technical Marketing Specialist, BASF Corporation

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Admixture Solutions



# Transit Mix Concrete Co. Materials Laboratory

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2596 Hwy 96 East  
 Pueblo, Colorado 81002  
 Ph. (719) 543-7898 Fax (719) 583-0345

February 17, 2011

RE: Fine Concrete Aggregate  
 Daniels Sand Pit  
 3710 Bradley Road  
 Colorado Springs, Colorado 80916

Gentlemen:

This letter presents the results of physical properties and deleterious substances tests performed on a Fine Concrete Aggregate that was sampled on January 6, 2011 at Daniels Sand Pit. The results are as follows:

Sieve Size	Percent Passing	Specifications
ASTM C 33: Fine Concrete Agg.		
9.5 mm, 3/8"	100	100
4.75 mm, No. 4	100	95 - 100
2.36 mm, No. 8	89	80 - 100
1.18 mm, No. 16	69	50 - 85
600 um, No. 30	51	25 - 60
300 um, No. 50	28	10 - 30
150 um, No. 100	8.2	0 - 10
75 um, No. 200	1.0	0 - 3
Fineness Modulus: 2.60		AASHTO T-37
Bulk Specific Gravity (SSD): 2.59 Absorption: 1.0%		AASHTO T-85
Magnesium Sulfate Soundness (Five Cycles): 2.1% Loss		AASHTO T-104
Sodium Sulfate Soundness (Five Cycles): 1.0% Loss		AASHTO T-104
Average Sand Equivalent: 87		AASHTO T-176
Organic Impurities: Clear		AASHTO T-21
Mortar Bar Expansion (ASR) - Sodium Hydroxide: 0.04%		AASHTO T-303

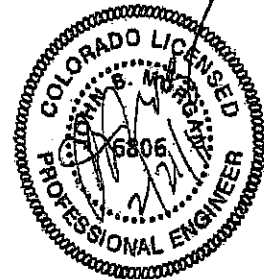
The above sample was tested according to American Society for Testing and Materials (ASTM) procedures D-75, D-2419, C-702, C-117, C-136, C-33, C-40, C-88, C-128 and C-1260.

If you have any questions feel free to contact me at your earliest convenience.

Respectfully Submitted,



Grant W. Smith  
 Quality Control Manager



# Transit Mix Concrete Co. Materials Laboratory

444 East Castilla Avenue  
 Colorado Springs, Colorado 80903  
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## Modified ASTM C 1260 / C 1567 Tests

No. 1025D-1-6

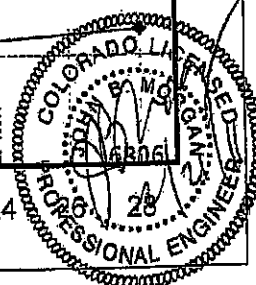
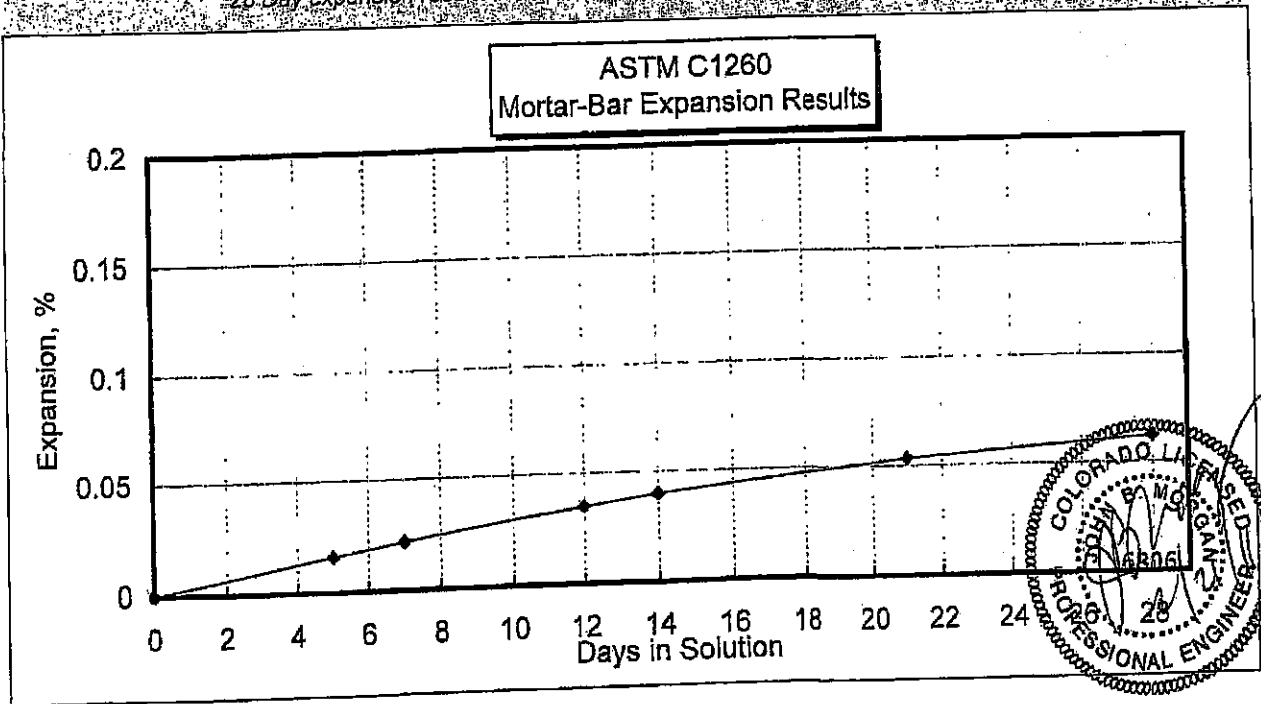
Standard Test Method for Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction

Materials	Source	Product	Blend	Batch Weights, g		Notes
Cement	Holcim Florence, CO	Type I/II	100%	440	440	Batched: 1/17/2011
Flyash						
Coarse Sand	Daniels Colo Spgs, CO	FCA	100%	990	990	
Water				206.8		
W/C Ratio				0.47		Completed: 2/16/2011

Specimen ID:		D-1, 2, 3			Mortar Bar Expansion, %			Average
Days	Date	Comparator Readings			1	2	3	
		1	2	3				
0	1/19/2011	0.1700	0.1700	0.1710				0.6000
5	1/24/2011	0.1716	0.1714	0.1727	0.0160	0.0140	0.0170	0.0157
7	1/26/2011	0.1721	0.1722	0.1732	0.0210	0.0220	0.0220	0.0217
12	1/31/2011	0.1735	0.1735	0.1745	0.0350	0.0350	0.0350	0.0350
14	2/2/2011	0.1740	0.1740	0.1750	0.0400	0.0400	0.0400	0.0400
21	2/9/2011	0.1753	0.1754	0.1764	0.0530	0.0540	0.0540	0.0537
28	2/16/2011	0.1763	0.1762	0.1772	0.0630	0.0620	0.0620	0.0623

Average Percent Expansion at 14 days in solution (16 days of age) 0.04

28 Day expansion results are for informational purposes only 0.06



# Transit Mix Concrete Co. Materials Laboratory

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 Colorado Springs, Colorado 80903  
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2596 Hwy 96 East  
 Pueblo, Colorado 81002  
 Ph. (719) 543-7898 Fax (719) 583-0345

## Modified ASTM C 1260 / C 1567 Tests

No. 1037BC-1-7

Standard Test Method for Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction

Materials	Source	Product	Blend	Batch Weights, g		Notes
Cement	Holcim Florence, CO	Type I/II	100%	440	440	Batched: 1/17/2011
Flyash						
Coarse Sand	Blk Cyn Colo Spgs, CO	57/67	100%	990	990	
Water				206.8		
W/C Ratio				0.47		Completed: 2/16/2011

Specimen ID: BC-1, 2, 3

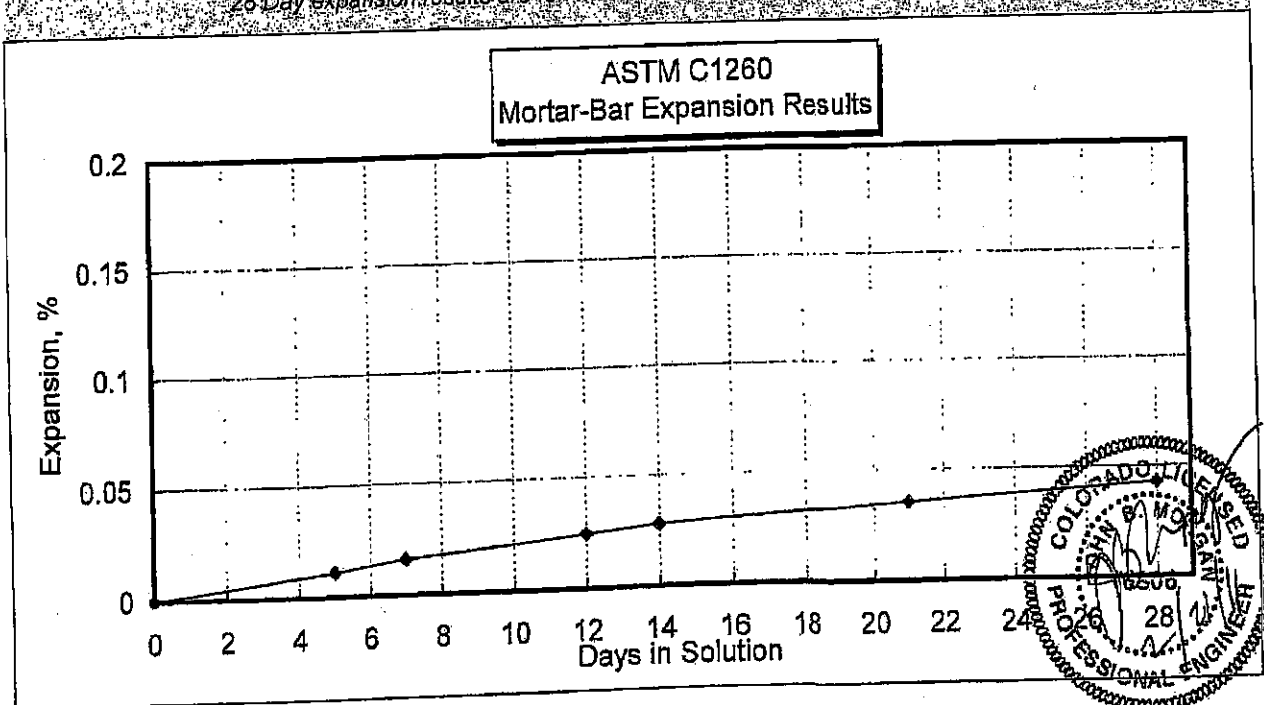
Days	Date	Comparator Readings			Mortar Bar Expansion, %			Average
		1	2	3	1	2	3	
								0.0000
0	1/19/2011	0.1699	0.1695	0.1705				0.0110
5	1/24/2011	0.1709	0.1707	0.1716	0.0100	0.0120	0.0110	0.0160
7	1/26/2011	0.1714	0.1711	0.1722	0.0150	0.0160	0.0170	0.0247
12	1/31/2011	0.1723	0.1720	0.1730	0.0240	0.0250	0.0250	0.0280
14	2/2/2011	0.1726	0.1723	0.1734	0.0270	0.0280	0.0290	0.0357
21	2/9/2011	0.1733	0.1732	0.1741	0.0340	0.0370	0.0360	0.0430
28	2/16/2011	0.1741	0.1739	0.1748	0.0420	0.0440	0.0430	

Average Percent Expansion at 14 days in solution (16 days of age)

0.03

28 Day expansion results are for informational purposes only

0.04



# Transit Mix Concrete Co. Materials Laboratory

444 East Castilla Avenue  
 Colorado Springs, Colorado 80903  
 Ph. (719) 475-0700 Fax (719) 475-0226

2596 Hwy 96 East  
 Pueblo, Colorado 81002  
 Ph. (719) 543-7898 Fax (719) 583-0343

February 17, 2011

RE: No. 57/67 Coarse Concrete Aggregate  
 Castle Concrete  
 7250 Allegheny Drive  
 Colorado Springs, CO 80919

Gentlemen:

This letter presents the results of physical properties and deleterious substances tests performed on a coarse aggregate that was sampled on January 7, 2011 at Black Canyon Quarry. The results are as follows:

Sieve Size	Percent Passing	Specifications	
		No. 57	No. 67
37.5 mm, 1 1/2"	100	100	----
25.0 mm, 1"	100	95 - 100	100
19.0 mm, 3/4"	93	----	90 - 100
12.5 mm, 1/2"	43	25 - 60	----
9.5 mm, 3/8"	23	----	20 - 55
4.75 mm, No. 4	2.5	0 - 10	0 - 10
2.36 mm, No. 8	1.8	0 - 5	0 - 5
75 um, No. 200	1.2	0 - 1.5	0 - 1.5
Los Angeles Abrasion (Grading B):	27.0% Loss	AASHTO	T-96
Bulk Specific Gravity (SSD):	2.63 Absorption: 1.5%	AASHTO	T-85
Magnesium Sulfate Soundness (Five Cycles):	6.3% Loss	AASHTO	T-104
Sodium Sulfate Soundness (Five Cycles):	4.2% Loss	AASHTO	T-104
Clay Lumps and Friable Particles:	0	AASHTO	T-112
Fractured Particles (2 Fractured Faces):	100%		
Organic Impurities:	Clear	AASHTO	T-21
Bulk Density by Rodding:	98 lb/ft <sup>3</sup> Voids: 40%	AASHTO	T-19
Mortar Bar Expansion (ASR) - Sodium Hydroxide:	0.03%	ASTM C	1260

The above sample was tested according to American Society for Testing and Materials (ASTM) procedures D-75, D-5821, C-702, C-117, C-136, C-33, C-40, C-142, C-88, C-127, C-131, C-29 and C-1567.

The above sample conforms to the requirements of ASTM C 33, TABLE 3, Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregate for Concrete, (1S, 2S, 3S, 4S, 5S, 1M, 2M, 3M, 4M, 5M, 1N and 2N).

If you have any questions feel free to contact me at your earliest convenience.

Respectfully Submitted,



Grant W. Smith  
 Quality Control Manager

