LAFARGE
AGGREGATES
& CONCRETE

April 11, 2011

Red Willow

Attn: Doug Connely
Re: Apple Blossom

Dear:

For your approval, we are pleased to submit the following mix design(s) for use on the above referenced project.

MIX I.D. NO.	LOCATION	DESCRIPTION	STRENGTH @ AGE
CE45DC5J	Concrete Paving	4500 psi with State Class D Spec	4500 psi @ 28 Days

PLEASE USE THE ABOVE MIX NUMBERS WHEN ORDERING.

When placing your order please call dispatch at (970) 407-3700.

Should Fibermesh or other additional mix ingredients be required by the job specifications, please specify so when ordering.

The required strengths will be met when the concrete is placed, tested and evaluated in accordance with applicable industry standards, project specifications and the enclosed "General Terms of Sale." Lafarge Corporation will not be responsible for concrete ordered and/or placed outside the design criteria as submitted. All materials used in the production of the submitted designs meet applicable standards.

As stated in ASTM C94-86b, Section 14.4, we are entitled to copies of all test reports in order to monitor the concrete strength results.

Respectfully submitted,

Bernie Lucero
Lafarge Corporation
Northern Concrete Division
(970) 396-3402 cell

Encls. 17

LAFARGE NORTH AMERICA INC. - Western U.S. Region
1800 N Taft Hill Road
Fort Collins, CO 80521
Main: (970) 407-3600 Fax: (970) 407-3900
www.lafargenorthamerica.com

LAFARGE
NORTH AMERICA

Mix Identification Code:	**CE45DC5J**
Old Mix Identification Code:	5612
Design Strength:	4500
Mix Description:	4500, 57/67, AE, STANDARD
Typical Usage:	Concrete Paving
Lafarge N.A. Lab No.:	

Mix Proportions:

Materials:	Type or Size	ASTM Standard	Design Weights per Cubic Yard			
Total Cementitious			645	lb.	min.	
Cement	1-2	C-150	80	%	min.	
SCM	Class C	C-618	20	%	max.	
Coarse Aggregate	57/67	C-33	59- 61	%		
Int. Aggregate	# 8	C-33		%		
Fine Aggregate	Sand	C-33	39- 41	%		
AEA		C-260	2.9	oz.		
WRA	A	C-494	3- 5	oz/cwt		
MRWR	A	C-494	6- 8	oz/cwt		
HRWR	F	C-494		oz/cwt		
Water	City	C-94	264	lb.	31.7	gal.

The above weights are based upon aggregates in a saturated, surface dry (SSD) condition. Batch plant corrections must be made for moisture in aggregates. Mix proportions may be adjusted in accordance with 301-05, section 4.2.3.5

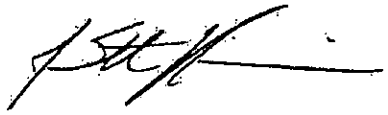
Physical Properties of Mixture:

Slump	3- 5	in.
Air Content	4 - 7	%
Unit Weight	142.3	pcf
Yield	27.18	cu. ft.
Water/Cement Ratio	0.41	

Compressive Strength (psi):

3 Day	7 Day	28 Day	56 Day
	4362	5661	

LAFARGE North America



J. Scott Keim, P.E.
Quality Assurance Manager
Front Range Concrete Division

LAFARGE
NORTH AMERICA

CONCRETE
STRENGTH TEST EVALUATION ACI-214/318

Mix design N° : RMXCE45DC5J (CE45DC5J) - 4500,57/67,AE,STANDARD [000] **Date :**

Strength : 4500 psi

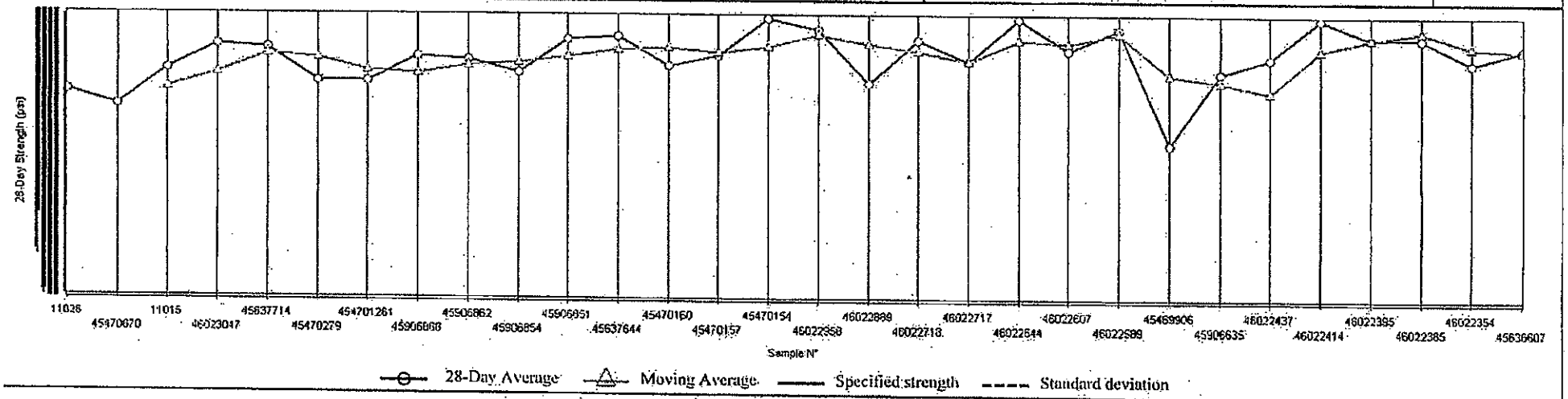
Plant(s) : All plants

Aggregate size : 1 in.-No.4

ACI 214 Strength analysis

	Slump (in.)	Air %	Temp °F	7-day psi	28-day psi
Minimum	2.75	4.5	54.0	2620	3630
Average	3.77	6.2	67.8	4362	5661
Maximum	5.50	7.5	77.0	5855	6590
Standard deviation	0.67	0.7	6	617	651

28-Day	
Average range	
Cumulative Coefficient of variation	11.51 %
Within-test Std	
Within-test Coefficient of variation	



ACI 318 Strength performance

Number of tests/Correction factor	30 / 1.000	Margin of extra performance(5661 - 5518)	143 psi
Adjusted Standard deviation	651 psi		
d2 factor for computing within-test standard deviation	1.128	Mix is approved	
fcr = f'c + 1.34 Std	5373 psi		
fcr = f'c + 2.33 Std - 500 psi	5518 psi		

Remarks :

Reported by : Date : 3/29/2011 Verified by :

P.O. Box 529
Lyons, CO 80540
Plant (303) 823-2100
Sales (303) 758-1334

CEMENT MILL TEST REPORT

Cement Identified as:

Plant: CEMEX Lyons Cement **TYPE I/II & GU CEMENT** **Date: 9/17/2010**
Location: Lyons, CO
Production Dates:
Beginning: August 1, 2010
Ending: August 31, 2010

STANDARD CHEMICAL REQUIREMENTS (ASTM C114)	TEST RESULTS	ASTM C150 SPEC.	TYPE I	TYPE II	ASTM C1157 SPEC.	TYPE GU
Silicon Dioxide (SiO_2), %	20.9		---	---		---
Aluminum Oxide (Al_2O_3), %	4.4	Maximum	---	6.0		---
Ferric Oxide (Fe_2O_3), %	2.9	Maximum	---	6.0		---
Calcium Oxide (CaO), %	63.7		---	---		---
Magnesium Oxide (MgO), %	1.1	Maximum	6.0	6.0		---
Sulfur Trioxide (SO_3), % **	3.4	Maximum	3.0**	3.0**		---
Loss on Ignition (LOI), %	2.0	Maximum	3.0	3.0		---
Insoluble Residue, %	0.45	Maximum	0.75	0.75		---
Alkalies (Na_2O equivalent), %	0.77		---	---		---
Tricalcium Silicate (C_3S), % *	55		---	---		---
Dicalcium Silicate (C_2S), % *	16		---	---		---
Tricalcium Aluminate (C_3A), % *	6	Maximum	---	8		---
Tetracalcium Aluminoferrite (C_4AF), % *	9		---	---		---
($C_3S + 4.75C_3A$)	86		---	---		---
($C_4AF + 2C_3A$) or ($C_4AF + C_2F$), %	22		---	---		---
CO_2, %	1.4		---	---		---
Limestone, %	3.5	Maximum	5.0	5.0		---
$CaCO_3$ in Limestone, %	88	Minimum	70	70		---
Heat of Hydration @ 7 day (kcal/kg)#	74		---	---		---
PHYSICAL REQUIREMENTS						
(ASTM C 204) Blaine Fineness, cm^2/gm	3890	Minimum	2600	2600		---
(ASTM C 430) -325 Mesh, %	96.6		---	---		---
(ASTM C 191) Time of Setting (Vicat)						
Initial Set, minutes	100	Min. - Max.	45 - 375	45 - 375	Min. - Max.	45 - 420
Final Set, minutes	185		---	---		---
(ASTM C 451) False Set, %	69	Minimum	50	50	Minimum	50
(ASTM C 185) Air Content, %	7	Maximum	12	12		---
(ASTM C 151) Autoclave Expansion, %	-0.01	Maximum	0.80	0.80	Maximum	0.80
(ASTM C 187) Normal Consistency, %	25.7		---	---		---
(ASTM C 1038) Expansion in Water, %	0.003	Maximum	0.020	0.020	Maximum	0.020
(ASTM C 109) Compressive Strength, psi (MPa)	psi / MPa					
1 Day	2570 / 17.7		---	---		---
3 Day	4120 / 28.4	Minimum	1740 (12.0)	1450 (10.0)	Minimum	1890 (13)
7 Day	4960 / 34.2	Minimum	2760 (19.0)	2470 (17.0)	Minimum	2900 (20)

*** Note D in Table 1 of ASTM C150-09 allows for additional sulfate, provided expansion as measured by ASTM C1038 does not exceed 0.020%.*

** Adjusted for Limestone Addition per ASTM C 150-09, A1.6*

 # Heat of Hydration is provided for information only

CEMEX hereby certifies that this cement meets or exceeds the chemical and physical Specifications of:

ASTM C150 - 09 for Type I Portland Cement
ASTM C150 - 09 for Type II Portland Cement
ASTM C1157 - 08a for Type GU Hydraulic Cement

By:
Anand Krishnan
Quality Control Manager
CEMEX - Lyons Cement Plant

Lafarge Northern Aggregates
November 10, 2010
Seaworth Pit

ASTM C 88, MAGNESIUM SULFATE SOUNDNESS, 5 CYCLES

SIEVE SIZE PASS	RETAIN	ORIGINAL GRADING OF SAMPLE (%)	WEIGHT OF TEST FRACTIONS, g	PERCENT PASSING	WEIGHTED LOSS (%)
¼"	#9				
3/8"	#4	14	300.0	5.1	0.71
#4	#8	69	100.0	10.0	6.90
#8	#16	14	100.0	5.3	0.74
#16	#30	2	-	(5.3)	0.11
#30	#50	0	-	(5.3)	0.0
MINUS #50		1	-		
TOTALS		100.0			8.5

ASTM C33 SPECIFICATION 15/18% MAX

Grace Construction Products

W.R. Grace & Co. - Conn.
4323 Crites Street
Houston, TX 77003

T 713-223-8353
www.graceconstruction.com

1/10/2011

Scott Keim
Lafarge North America
1590 W 12th Ave
Denver, Colorado 80204

Project Name:
Product Selected: Daravair® AT60

This is to certify that the Daravair AT60, a Air-Entraining Agent, as manufactured and supplied by Grace Construction Products, W.R. Grace & Co. – Conn., is formulated to comply with the Specifications for Chemical Admixtures for Concrete, ASTM: C260, AASHTO: M154.

Daravair AT60 does not contain calcium chloride or chloride containing compounds as a functional ingredient. Chloride ions may be present in trace amounts contributed from the process water used in manufacturing.

The foregoing is in addition to and not in substitution for our standard Conditions of Sale attached.

Thomas M. Greene
South Western Region Technical Services Manager

Grace Construction Products

W.R. Grace & Co. - Conn.
4323 Cries Street
Houston, TX 77003

T 713-223-8353
www.graceconstruction.com

1/10/2011

Scott Keim
Lafarge North America
1590 W 12th Ave
Denver, Colorado 80204

Project Name:
Product Selected: WRDA® 27

This is to certify that the WRDA 27, a Water Reducer, as manufactured and supplied by Grace Construction Products, W.R. Grace & Co. - Conn., is formulated to comply with the Specifications for Chemical Admixtures for Concrete, ASTM: C494, Type A, D, AASHTO: M194, Type A, D.

WRDA 27 does not contain calcium chloride or chloride containing compounds as a functional ingredient. Chloride ions may be present in trace amounts contributed from the process water used in manufacturing.

The foregoing is in addition to and not in substitution for our standard Conditions of Sale attached.

Thomas M. Greene
South Western Region Technical Services Manager

Grace Construction Products

W.R. Grace & Co. - Conn.
4323 Crites Street
Houston, TX 77003

T 713-223-8353

www.graceconstruction.com

1/10/2011

Scott Keim
Lafarge North America
1590 W 12th Ave
Denver, Colorado 80204

Project Name:
Product Selected: Daracem® 55

This is to certify that the Daracem 55, a Mid-Range Water Reducer, as manufactured and supplied by Grace Construction Products, W.R. Grace & Co. - Conn., is formulated to comply with the Specifications for Chemical Admixtures for Concrete, ASTM: C494, Type A, AASHTO: M194, Type A.

Daracem 55 does not contain calcium chloride or chloride containing compounds as a functional ingredient. Chloride ions may be present in trace amounts contributed from the process water used in manufacturing.

The foregoing is in addition to and not in substitution for our standard Conditions of Sale attached.

Thomas M. Greene
South Western Region Technical Services Manager

CONDITIONS

All orders are accepted and all sales are made subject only to the provisions of the written contract between us under which the order is placed, or if no such contract exists, subject only to the terms on the face hereof and to the following provisions.

1. Delivery and Freight; Risk of Loss. Title to and all risk of loss of all goods sold hereunder shall pass to Buyer upon delivery f.o.b. W. R. Grace & Co. s (Grace) plant to an agent of the Buyer including a common carrier, notwithstanding and prepayment or allowance of freight by Grace. If Grace pays freight Grace shall have the right to select the carrier, routing and means of transportation, provided that Buyer may make an alternate selection and pay Grace s additional costs, if any.

2. Freight, Weights and Orders.

(a) Whenever Grace is to pay freight Grace shall have the right initially to designate routing and means of transportation. If Buyer requires a more expensive routing and/or means of transportation Buyer shall reimburse Grace for any extra cost involved. GRACE SHALL NOT BE LIABLE FOR ANY DELAY IN TRANSPORTATION HOWEVER OCCASIONED.

(b) Grace s invoice weights, volumes, sizes, and tares shall be treated as prima facie correct except that in case of bulk shipments by carload, tank car or otherwise carriers weights shall be accepted as conclusive.

(c) Buyer s orders are not binding upon Grace until accepted in writing by an authorized employee at Grace s offices.

3. Examination, Suitability and Claims. Buyer shall examine and test each shipment of goods promptly upon delivery to Buyer and before any part of the goods has been changed from its original condition and Buyer hereby waives all claims for any cause after any part of the goods has been treated, processed or changed in any manner (except for reasonable test quantities). Buyer assumes sole responsibility for determining whether the goods are suitable for their contemplated use (whether or not such use is known to Grace). Buyer waives all claims of which Grace is not notified in writing within thirty (30) days after delivery of the goods or in respect of goods disposed of or returned without Grace s consent.

4. Warranties, Remedies and Limitations.

(a) Grace warrants to Buyer that at the time of delivery the goods sold hereunder will conform substantially to the description on the face hereof. Grace s liability and Buyer s remedy under this warranty are limited in Grace s discretion to replacement of goods returned to Grace which are shown to Grace s reasonable satisfaction to have been nonconforming or to refund of the purchase price, or, if not paid, to a credit in the amount of the purchase price. Transportation charges for the return of nonconforming goods to Grace and the risk of loss thereof will be borne by Grace only if returned in accordance with written instructions from Grace.

(b) Grace warrants that the goods will not in and of themselves infringe any patent of the United States or Canada. Grace s liability under this warranty is conditioned upon Buyer s giving prompt written notice of any claim of patent infringement made against Buyer, all information available to Buyer in respect of the claim, and Buyer s granting Grace exclusive control of its settlement and/or litigation. Grace may discontinue without liability delivery of the goods if in Grace s opinion their manufacture, sale or use would constitute patent infringement. If the use or resale of the goods is finally enjoined Grace shall at Grace s option (i) procure for Buyer the right to use or resell the goods previously delivered, (ii) replace such goods with equivalent noninfringing goods, (iii) modify them so they become noninfringing but equivalent, or (iv) refund the purchase price (less a reasonable allowance for use, damage and obsolescence). Grace makes no warranty against patent infringement resulting resulting from the manufacture, use or sale of the goods if made to Buyer s specifications or from use of the goods in combination with other matter or in the operation of any process, and if a claim, suit or action is based thereon Buyer shall defend, indemnify and save harmless Grace therefrom.

(c) Grace warrants to Buyer that it will convey goods sold hereunder. Grace s liability and Buyer s remedy under this warranty are limited to the removal of any title defect or, at the election of Grace, to the replacement of the goods or any part thereof which are defective in title; provided, however, that the rights and remedies of the parties with respect to patent infringement shall be limited to the provisions of paragraph (b) above.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE GIVEN AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. THE REMEDIES OF BUYER FOR ANY BREACH OF WARRANTY SHALL BE LIMITED TO THOSE PROVIDED HEREIN AND FOR DELAY OR NONDELIVERY WHICH IS NOT EXCUSABLE TO THE PURCHASE PRICE OF THE GOODS IN RESPECT OF WHICH THE DELAY OR NONDELIVERY IS CLAIMED TO THE EXCLUSION OF ANY AND ALL OTHER REMEDIES INCLUDING, WITHOUT LIMITATION, INCIDENTAL OR CONSEQUENTIAL DAMAGES, NO AGREEMENT VARYING OR EXTENDING THE FOREGOING WARRANTIES, REMEDIES OR THIS LIMITATION WILL BE BINDING UPON GRACE UNLESS IN WRITING, SIGNED BY DULY AUTHORIZED OFFICER OF GRACE.

5. Prices, Credit and Payment.

(a) Buyer shall pay for goods, according to the terms of payment as specified on the face hereof or those terms specifically quoted to Buyer in writing. Pro rata payments shall become due as deliveries are made. Prices are subject to change without notice; however, on orders accepted for shipment within thirty (30) days, process in effect at the time of acceptance will apply unless shipment is delayed beyond thirty (30) days, in which event prices in effect at the time of shipment will apply.

(b) If Buyer shall fail to fulfill the terms of payment, or if Grace at any time shall have any doubt as to Buyer s financial responsibility, Grace without liability to Buyer may decline to make further shipments except against cash or satisfactory security.

(c) If Grace is prevented from revising prices or from continuing any price already in effect by any action of government or by compliance with any request of government, Grace may cancel this contract or any undelivered portion thereof without liability to Buyer upon written notice of such termination to Buyer.

6. Taxes, Duties and Excises. In the absence of satisfactory evidence of exemption supplied to Grace by Buyer, Buyer shall pay in addition to the price of the goods all taxes, duties, excises or other charges for which Grace may be responsible for collection or payment to any government (national, state, or local) upon, measured by or relating to the importation, exportation, production, or any phase or part of the production storage, sale, transportation and/or use of the goods identified on the face hereof.

7. Force Majeure.

(a) Buyer acknowledges that the goods called for hereunder are to be specially manufactured by Grace to fulfill this contract and delivery dates are based on the assumption that there will be no delay due to causes beyond the reasonable control of Grace.

(b) Grace shall not be charged with any liability for delay or nondelivery when due to delays of suppliers, production problems, acts of God or the public enemy, compliance with any applicable foreign or domestic court order or governmental regulation, order or request whether or not it proves to be invalid, fires, riots, labor disputes, unusually severe weather, or any other cause beyond the reasonable control of Grace. During the period when deliveries are affected by the matters identified in this paragraph, Grace may omit delivery during the period of continuance of such circumstances and the contract quantity shall be reduced by the quantity so omitted, but this contract shall remain otherwise in effect. Grace shall endeavor to allocate any available goods among all buyers including its own divisions, departments and affiliates in such manner as it considers fair.

8. Assignment and Nonwaiver.

(a) This contract is not assignable or transferable by Buyer whether voluntary or by operation of law in whole or in part, without the prior written consent of Grace.

(b) Grace s failure to insist upon strict performance of any provision hereof shall be deemed to be a waiver of Grace s rights or remedies or a waiver by Grace of any subsequent default by Buyer in the performance of or compliance with any terms hereof.

9. Separate Contract. Each delivery shall stand and may be recovered for as a separate and independent contract. If Buyer fails to fulfill the terms of order, purchase, or payment under this or any other contract with Grace, Grace without prejudice to other lawful remedies may at its option defer further shipments hereunder until such default is made good, treat such default as a breach of this entire contract or terminate this contract.

10. Compliance with Fair Labor Standards Act. Grace hereby certifies that all goods sold hereunder which are produced or manufactured in the United States of America are produced in compliance with Sections 6, 7, or 12 of the Fair Labor Standards Act of 1938, as amended (29 U.S. Code 201-219), or of any order of the Administrator issued under Section 14 of said Act. All requirements as to the certified contemplated in the October 26, 1949 amendment to the Fair Labor Standards Act of 1938 shall be considered as satisfied by this certification.

11. Royalties; Miscellaneous. The purchase of equipment from Grace confers no license, express or implied, under any patent. When goods identified on the face hereof include goods suitable for use according to Grace s patents, a royalty (amount obtainable upon request) is included in the purchase price. Goods identified on the face hereof may vary according to Grace s established limits, sizes and tolerances in effect at the time of delivery in respect of such goods. ANY ADVICE FURNISHED BUYER CONCERNING THE USE OF THE GOODS SHALL REPRESENT GRACE S BEST JUDGEMENT IN THE CIRCUMSTANCES BUT IS ACTED UPON AT BUYER S SOLE RISK.

12. Entire Contract and Construction.

(a) The contract between Buyer and Grace in respect of the goods identified on the face hereof consists in its entirety of the terms and conditions appearing on the face and back of this document in lieu of all others, and supersedes all previous communications, representations or agreements, either oral or written, between the parties hereto with respect to the subject matter hereof. No modification shall be effected by the acknowledgement or acceptance of Buyer s purchase order forms or other documents containing terms or conditions different from or in addition to those contained herein.

(b) Acceptance or use by Buyer of any goods delivered hereunder shall be an acceptance of these as the only terms and conditions applying to the purchase and sale of said goods unless other terms and conditions be agreed to in writing signed by both parties specifically referring to this contract.

(c) This contract shall be interpreted in accordance with and the construction thereof shall be governed by the laws of the Commonwealth of Massachusetts. Captions as used in these terms and conditions are for convenience of reference only and shall not be deemed or construed as in any way limiting or extending the languages of the provisions to which such captions may refer.

FIBERMESH® 300

PRODUCT DATA SHEET

FIBERMESH® 300 SYNTHETIC FIBER

Fibermesh 300, formerly InForce™ e3® micro-reinforcement system for concrete—100 percent virgin homopolymer polypropylene fibrillated fibers with e3® patented technology containing no reprocessed olefin materials. Specifically engineered and manufactured in an ISO 9001:2000 certified facility to an optimum gradation for use as concrete secondary reinforcement at a minimum of 0.1% by volume (1.5 lbs/yd³, 0.9 kg/m³). UL Classified. Complies with National Building Codes and ASTM C 1116/C 1116M, Type III fiber reinforced concrete.

ADVANTAGES

Accepted by National Codes as an alternate method of secondary reinforcing to traditional systems • Non-magnetic • Rustproof • Alkali proof • Requires no minimum amount of concrete cover • Is always positioned in compliance with codes • Safe and easy to use • Saves time and hassle

FEATURES & BENEFITS

- Alternate system to welded wire reinforcement for secondary reinforcing in concrete
- Inhibits and controls the formation of intrinsic cracking in concrete
- Reinforces against impact forces
- Reinforces against the effect of shattering forces
- Reinforces against material loss from abrading forces
- Reinforces against water migration
- Provides improved durability
- Imparts toughness to hardened concrete
- Reduces plastic shrinkage and settlement cracking
- Provides residual strength

PRIMARY APPLICATIONS

Applicable to all types of concrete which demonstrate a need for toughness, resistance to intrinsic cracking and improved water tightness.

• Slabs-on-ground	• Stucco	• Composite metal decks
• Sidewalks	• Curbs	• Slope paving
• Driveways	• Shotcrete	• Overlays & toppings

CHEMICAL AND PHYSICAL PROPERTIES:

Absorption	Nil	Melt Point	324°F (162°C)
Specific Gravity	0.91	Ignition Point	1100°F (593°C)
Fiber Length*	Graded	Thermal Conductivity	Low
Electrical Conductivity	Low	Alkali Resistance	Alkali Proof
Acid & Salt Resistance	High		

*Also available in single cut lengths.

DO SPECIFY FIBERMESH 300 FIBERS:

- Reduced plastic shrinkage cracking
- Alternative to traditional reinforcement
- Improved impact, shatter and abrasion resistance
- Improved residual strength
- Reduced water migration and damage from freeze/thaw
- Improved durability
- Areas requiring non-metallic materials

DO NOT SPECIFY FIBERMESH 300 FIBERS:

- Crack control from external stresses
- Increasing joint spacing beyond ACI and PCA guidelines
- Decreasing thickness of slabs
- Replacing any moment or structural steel

PROPEX® | THE ADVANTAGE CREATORS.™

CONCRETE SYSTEMS

P.O. Box 529
Lyons, CO 80540
Plant (303) 823-2100
Sales (303) 758-1334

CEMENT MILL TEST REPORT

Cement Identified as:

Plant: CEMEX Lyons Cement **TYPE I/II & GU CEMENT** **Date: 9/17/2010**
Location: Lyons, CO
Production Dates:
Beginning: August 1, 2010
Ending: August 31, 2010

Additional Data

Inorganic Processing Addition Data

Type	None Added

Base Cement Phase Composition

C_3S (%)	57
C_2S (%)	17
C_3A (%)	7
C_4AF (%)	9

CEMEX hereby certifies that the above described data represents the materials used in the cement manufactured during the production period indicated.

By:
Anand Krishnan
Quality Control Manager
CEMEX - Lyons Cement Plant

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Office of Biotechnology
Materials Analysis and Research Laboratory
23 Town Engineering
Ames, Iowa 500 -1-3232
515 294-8752 or 8761
FAX 515 294-4563
www.marl.iastate.edu

FLY ASH ANALYSIS

Report To: Dale Kisling **Date:** 01/11/2011

Laboratory No.: GGSCOMP11-10 **Date Received:** 12/07/2010

Sample Identification: Gerald Gentleman Station, Unit #1

CHEMICAL COMPOSITION (mass %):		ASTM C 618-08 Criteria Class F	Class C
Silicon Oxide (SiO_2)	34.0		
Aluminum Oxide (Al_2O_3)	19.2		
Iron Oxide (Fe_2O_3(T))	5.7		
SUM (SiO_2+Al_2O_3+Fe_2O_3(T))	58.9	....70.0 min.	....50.0 min.
Sulfur Trioxide (SO_3)	1.8	.....5.0 max.	.....5.0 max.
Calcium Oxide (CaO)	27.8		
Magnesium Oxide (MgO)	5.2		
Moisture Content	0.0	.....3.0 max.	.....3.0 max.
Loss on Ignition	0.2	.....6.0 max.	.....6.0 max.
Available Alkalis, equiv. %Na_2O	1.27		
PHYSICAL TEST RESULTS:			
Fineness			
Retained on a 45-μm sieve, (%)	16.5	.....34 max.	.....34 max.
Strength Activity Index			
With Portland Cement, (%)			
Ratio to Control @ 28 days	99	.....75 min.	.....75 min.
Ratio to Control @ 7 days	92	.....75 min.	.....75 min.
Water Requirement, (% of Control)	95	....105 max.	....105 max.
Soundness			
Autoclave Expansion, (%)	0.06	....0.8 max.	....0.8 max.
Density (g per cubic cm)	2.65		

REMARKS:

11th composite sample for 2010; represents ash sampled from November 2010.

7

S

Materials Analysis & Research Laboratory - Participants in the Cement & Concrete Reference Laboratory pozzolan testing program.

Approved: S Zoll-S

LAFARGE
AGGREGATES
& CONCRETE

Lafarge Front Range Aggregates
1800 North Taft Hill Road
Fort Collins, CO 80521

November 10, 2010

Attention: Mr. Gary Pearcy

Subject: C-33 Physical Property Test Results
Seaworth Pit
Fort Collins, Colorado

Gentlemen:

Enclosed are the results of physical properties tests conducted on representative concrete aggregates and sand sampled from the Seaworth Pit on September 24, 2010. The tests were performed to verify compliance with ASTM C33 specifications. Please contact us for current average shipping gradations, as needed. The following tests were performed:

		1-1/2" #4	1"-3/4" #57-#67	3/8" #8	¼" #9	Concrete Sand
ASTM C136, C117	GRADATION AND PERCENT FINES	See Table 1	See Table 1	See Table 1	See Table 1	See Table 1
ASTM C29	BULK DENSITY AND VOIDS, PCF & %	98.1 / 41	97.9 / 40	96.0 / 41	97.3 / 40	102.4/37
ASTM C127	RELATIVE DENSITY (SSD)	2.677	2.675	2.642	2.629	-
	AND ABSORPTION	0.6	0.8	0.9	0.9	-
ASTM C128	RELATIVE DENSITY (SSD)	-	-	-	-	2.629
	AND ABSORPTION	-	-	-	-	0.7
ASTM C40	ORGANIC IMPURITIES	-	-	-	-	Plate 1
ASTM C123	LIGHTWEIGHT PIECES	0.0	0.0	0.0	0.0	0.0
ASTM C131	LOS ANGELES ABRASION	30	26	31	31	-
ASTM C142	CLAY LUMPS & FRIABLE PARTICLES	0.0	0.02	0.07	0.4	0.1
ASTM C88	MAGNESIUM SULFATE SOUNDNESS %	0.7	2.7	4.1	8.5	5.3
ASTM D2419	SAND EQUIVALENT	-	-	-		92
CDOT CP4211	MICRO-DEVAL	6.7	8.3	8.9	9.0	-

The complete test results are attached. As indicated by the results, the material meets the applicable ASTM C33 specifications for the properties tested. If you have any questions on the data presented, please contact us at your convenience.

Sincerely,
Lafarge Engineering Services

Stan Peters, P.E
Castle Rock Consulting, LLC

COLORADO LICENSED
STANLEY R. PETERS
26128
11-10-10
PROFESSIONAL ENGINEER

Enclosures

LAFARGE NORTH AMERICA INC - Western US Business Unit
1195 Quivas Street
Denver, CO 80204
Office: (303) 657-4270 Fax: (303) 657-4266
Web: lafargenorthamerica.com

AAPA AASHTO R18

Lafarge Northern Aggregates
November 10, 2010
Seaworth Pit

TABLE NO. 1
PHYSICAL PROPERTY TEST RESULTS
SEAWORTH PIT

ASTM C136, SIEVE ANALYSIS OF COARSE AND FINE AGGREGATE

SIEVE SIZE	1-1/2" SAMPLE % PASS	ASTM #4 SPEC	1"-3/4" SAMPLE % PASS	ASTM #57/#67 SPEC	3/8" SAMPLE % PASS	ASTM #8 SPEC	1/4" SAMPLE %PASS	ASTM #9 SPEC	Sand SAMPLE %PASS	ASTM C33 FINE SPEC
2"	100	100								
1-1/2"	98	90-100	100	100						
1"	44	20-55	100	100						
3/4"	6	0-15	92	90-100						
1/2"	1		43	25-60	100	100				
3/8"	1	0-5	25	20-55	99	85-100	100	100	100	100
#4			3	0-10	23	10-30	86	85-100	100	95-100
#8			2	0-5	5	0-10	17	10-40	98	80-100
#16					3	0-5	3	0-10	77	50-85
#30							1		44	25-60
#50							1	0-5	15	5-30
#100									2	0-10
#200 (C117)	0.8	1.0	0.5	1.0	0.9	1.0	0.8	1.0	0.9	0-3.0
FINENESS MODULUS:									2.91	2.3-3.1
SAND EQUIVALENT:									92	

ASTM C 29, BULK DENSITY ("UNIT WEIGHT") AND VOIDS IN AGGREGATE BY RODDING

SAMPLE SIZE	BULK DENSITY, pcf	VOIDS (%)
1-1/2" #4	98.1	41
1"/3/4" #57/67	97.9	40
3/8" #8	96.0	41
¼" #9	97.3	40
Sand	102.4	37

ASTM C 127, DENSITY, RELATIVE DENSITY, AND ABSORPTION OF COARSE AGGREGATE

SAMPLE SIZE	BULK DRY	SSD	ABSORPTION (%)
1-1/2" #4	2.661	2.677	0.6
1"/3/4" #57/67	2.652	2.675	0.8
3/8" #8	2.619	2.642	0.9
¼" #9	2.606	2.629	0.9

ASTM C 128, DENSITY, RELATIVE DENSITY, AND ABSORPTION OF FINE AGGREGATE

SAMPLE SIZE	BULK DRY	SSD	ABSORPTION (%)
SAND	2.609	2.629	0.7

ASTM C 40, ORGANIC IMPURITIES IN FINE AGGREGATE

SAMPLE SIZE	PLATE NO.	ASTM C33 SPECIFICATION
SAND	Plate 1	PLATE NO. 3 or LESS

Lafarge Northern Aggregates
November 10, 2010
Seaworth Pit

ASTM C 123, LIGHTWEIGHT PIECES (ZINC-CHLORIDE SOLUTION)

SAMPLE SIZE	MASS OF TEST SAMPLE, g	LIGHTWEIGHT PIECES (%)	ASTM C33 SPECIFICATION
1-1/2 "	5002.6	0.0	0.5% MAX
1"/3/4"	3002.5	0.0	0.5% MAX
3/8"	1504.6	0.0	0.5% MAX
¼"	300.6	0.0	0.5% MAX
SAND	300.3	0.0	0.5% MAX

ASTM C 131, LOS ANGELES ABRASION

SAMPLE SIZE	GRADING	LOSS (%)	ASTM C33 SPECIFICATION
1-1/2 "	A	30	50% MAX
1"/3/4"	B	26	50% MAX
3/8"	C	31	50% MAX
1/4"	D	31	50% MAX

CDOT CPL 4211, MICRO-DEVAL ABRASION

SAMPLE SIZE	GRADING	LOSS(%)	CDOT SPECIFICATION
1-1/2"	7.2	6.7	18% Maximum
1"/3/4"	7.3	8.3	18% Maximum
3/8"	7.4	8.9	18% Maximum
¼"	8.2	9.0	18% Maximum

ASTM C 142, CLAY LUMPS AND FRIABLE PARTICLES

SAMPLE SIZE	CLAY LUMPS AND FRIABLE PARTICLES (%)	ASTM C33 SPECIFICATION
1-1/2 "	0.0	2.0% MAX
1"/3/4"	0.02	2.0% MAX
3/8"	0.07	2.0% MAX
¼"	0.4	2.0% MAX
SAND	0.1	3.0% MAX

ASTM C 88, MAGNESIUM SULFATE SOUNDNESS, 5 CYCLES

SIEVE SIZE PASS	RETAIN	ORIGINAL GRADING OF SAMPLE (%)	WEIGHT OF TEST FRACTIONS, g	PERCENT PASSING	WEIGHTED LOSS (%)
SAND					
3/8"	#4	-	-	-	-
#4	#8	2	100.0	23.3	0.5
#8	#16	21	100.0	6.9	1.4
#16	#30	33	100.0	5.4	1.8
#30	#50	29	100.0	5.6	1.6
MINUS #50		15	--	-	
TOTALS		100.0			5.3
ASTM C33 SPECIFICATION					15% MAX

Lafarge Northern Aggregates
November 10, 2010
Seaworth Pit

ASTM C 88, MAGNESIUM SULFATE SOUNDNESS, 5 CYCLES

SIEVE SIZE PASS	SIEVE SIZE RETAIN	ORIGINAL GRADING OF SAMPLE (%)	WEIGHT OF TEST FRACTIONS, g	PERCENT PASSING	WEIGHTED LOSS (%)
1-1/2"					
2" to 1-1/2"		2	-	(0.7)	0.01
1-1/2" to 3/4"		92	1524.5	0.7	0.64
3/4" to 3/8"		6	671.7	0.8	0.05
3/8" to #4		-	-	-	
MINUS #4					
TOTALS		100			0.7
ASTM C33 SPECIFICATION					18 % MAX

QUALITATIVE EXAMINATION OF COARSE SIZES
(Particles Exhibiting Distress)

SIEVE SIZE PASS	SIEVE SIZE RETAIN	SPLITTING No.	SPLITTING %	CRUMBLING No.	CRUMBLING %	CRACKING No.	CRACKING %	FLAKING No.	FLAKING %	TOTAL # Pcs. BEFORE TEST
1-1/2"	3/4"	0	0	1	4.7	1	2.3	3	7.0	43

ASTM C 88, MAGNESIUM SULFATE SOUNDNESS, 5 CYCLES

SIEVE SIZE PASS	SIEVE SIZE RETAIN	ORIGINAL GRADING OF SAMPLE (%)	WEIGHT OF TEST FRACTIONS, g	PERCENT PASSING	WEIGHTED LOSS (%)
1"/3/4"					
1-1/2" to 3/4"		8	501.5	2.5	0.2
3/4" to 3/8"		67	1005.3	2.2	1.5
3/8" to #4		22	300.3	4.5	1.0
MINUS #4		3	-	-	-
TOTALS		100			2.7
ASTM C33 SPECIFICATION					18 % MAX

QUALITATIVE EXAMINATION OF COARSE SIZES
(Particles Exhibiting Distress)

SIEVE SIZE PASS	SIEVE SIZE RETAIN	SPLITTING No.	SPLITTING %	CRUMBLING No.	CRUMBLING %	CRACKING No.	CRACKING %	FLAKING No.	FLAKING %	TOTAL # Pcs. BEFORE TEST
1-1/2"	3/4"	3	9.4	2	6.2	2	0	0	0	39

ASTM C 88, MAGNESIUM SULFATE SOUNDNESS, 5 CYCLES

SIEVE SIZE PASS	SIEVE SIZE RETAIN	ORIGINAL GRADING OF SAMPLE (%)	WEIGHT OF TEST FRACTIONS, g	PERCENT PASSING	WEIGHTED LOSS (%)
3/8"					
3/4" to 3/8"		1	330.6	2.2	0.02
3/8" to #4		76	300.4	5.4	4.10
MINUS #4		23	-	-	-
TOTALS		100			4.1
ASTM C33 SPECIFICATION					18 % MAX

FIBERMESH® 300

PRODUCT USE

MIXING DESIGNS AND PROCEDURES: Fibermesh® 300 micro-reinforcing is a mechanical, not chemical, process. The addition of Fibermesh 300 fibrillated fiber does not require any additional water or other mix design changes at normal rates. Fibermesh 300 fibrillated fiber is added to the mixer before, during or after batching the other concrete materials. Mixing time and speed are specified in ASTM C 94.

FINISHING: Fibermesh 300 micro-reinforced concrete can be finished by any finishing technique. Exposed aggregate, broomed and tined surfaces are no problem.

APPLICATION RATE: The standard application rate for Fibermesh 300 fibrillated fibers is 1.5 lbs/yd³ (0.9 kg/m³). For specialty performance see your local Fibermesh representative for recommendations regarding increased application rates.

GUIDELINES

Fibermesh 300 fibers should not be used to replace structural, load-bearing reinforcement. Fibermesh 300 fibers should not be used as a means of using thinner concrete sections than original design. Fibermesh 300 fibers should not be used to increase joint spacing past those dimensions suggested by PCA and ACI industry standard guidelines.

COMPATIBILITY

Fibermesh 300 fibers are compatible with all concrete admixtures and performance enhancing chemicals, but require no admixtures to work.

PACKAGING

Fibermesh 300 fibers are available in a variety of packaging options. The 1.5 lb bag (1 bag per cubic yard, 0.9 kg/m³) is standard. Special packaging is available for full truckload addition. Bags are packed into cartons, shrink-wrapped and palletized for protection during shipping.

TECHNICAL SERVICES

Trained Propex Concrete Systems specialists are available worldwide to assist and advise in specifications and field service. Propex Concrete Systems representatives do not engage in the practice of engineering or supervision of projects and are available solely for service and support of our customers.

REFERENCE DOCUMENTS

- ASTM C 94/C 94M Standard Specification for Ready-Mixed Concrete.
- ASTM C 1116/C 1116M Standard Specification for Fiber-Reinforced Concrete.
- ASTM C 1399 Standard Test Method for Obtaining Average Residual-Strength of Fiber-Reinforced Concrete.
- ASTM C 1436 Standard Specification for Materials for Shotcrete.
- ASTM C 1609/C 1609M Standard Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam With Third-Point Loading). Replaces ASTM C 1018.
- ACI 304 Guide for Measuring, Mixing, Transporting and Placing Concrete.
- ACI 506 Guide for Shotcrete.
- International Code Council (ICC) ESR 1165 Report.

CLASSIFIED UL® Classified: Type Fibermesh 300 fiber. For use as an alternate or in addition to the welded wire fabric used in Floor-Ceiling D700, D800, D900 Series Designs. Fiber may also be used in Floor-Ceiling Design Nos. G229, G243, G256, G514. Fibers added to concrete mix at a rate of 1.5 lb of fiber for each cubic yard of concrete.

SPECIFICATION CLAUSE

Use only Fibermesh 300 - 100 percent virgin polypropylene fibrillated fibers with e3® patented technology containing no reprocessed olefin materials and specifically manufactured to an optimum gradation for use as concrete secondary reinforcement. Application per cubic yard shall equal a minimum of 0.1% by volume (1.5 lbs/yd³, 0.9 kg/m³). Fibermesh 300 fibers are for the control of cracking due to drying shrinkage and thermal expansion/contraction, lowered water migration, increased impact capacity, shatter resistance, abrasion resistance and residual strength. Fiber manufacturer shall document evidence of ten year satisfactory performance history, ISO 9001:2000 certification of manufacturing facility, compliance with applicable building codes and ASTM C 1116/C 1116M, Type III fiber reinforced concrete. Fibrous concrete reinforcement shall be manufactured by Propex Concrete Systems, 6025 Lee Highway, Suite 425, PO Box 22788, Chattanooga, TN 37422, USA, tel: 423 892 8080, fax: 423 892 0157, web site: fibermesh.com.

PROPEX® | THE ADVANTAGE CREATORS.™

CONCRETE SYSTEMS

NORTH AMERICA
Propex Concrete Systems Corp.
6025 Lee Highway, Suite 425
PO Box 22788
Chattanooga, TN 37422
Tel: 800 621 1273
Tel: 423 892 8080
Fax: 423 892 0157

INTERNATIONAL
Propex Concrete Systems Ltd.
Propex House, 9 Royal Court, Basil Close
Chesterfield, Derbyshire, S41 7SL.UK
Tel: +44 (0) 1246 564200
Fax: +44 (0) 1246 465201

www.fibermesh.com

CS-510

10/07

SOILOGIC

April 21, 2011

Brinkman Construction, Inc.
3003 East Harmony Road, Suite 300
Fort Collins, Colorado 80528

Attn: Mr. Dave Derbes

Re: Pavement Section Design
712 West Laurel Street (Alleyway Pavements)
Fort Collins, Colorado
Soilogic Project # 10-1012

Mr. Derbes:

Our geotechnical subsurface exploration report for the subject property was submitted to your attention in a report dated September 1, 2010. At this time we understand the west alleyway adjacent to the property will be paved in Portland cement concrete. A rigid pavement section design for the west alleyway is included with this report. Small grade changes are anticipated to develop finish site grades in the alleyway area.

In summary, the subsurface materials encountered in the completed site borings consisted of a thin layer of topsoil and vegetation underlain by light brown to light reddish brown lean clay with varying amounts of silt and sand. The lean clay showed low volume change potential with variation in moisture content at in situ moisture and density conditions. The lean clay extended to the bottom of boring B-3 at a depth of approximately 10 feet below ground surface and to depths ranging from approximately 12 to 13½ feet below ground surface at boring locations B-1 and B-2. At boring locations B-1 and B-2, the lean clay was underlain by clayey sand and gravel. The sand and gravel was dense and extended to the bottom of boring at a depth of approximately 15 feet below present site grads. Groundwater was not encountered in any of the completed site borings at the time of drilling.

Based on the subsurface conditions encountered in the completed site borings and results of laboratory testing, it is our opinion subgrade soils similar to those encountered on the development property could be used for direct support of the alleyway pavements. Some gravel surfacing was observed in the existing alleyway and would be expected to contribute to the overall support strength of the pavement subgrade soils. Structural credit for the existing aggregate surfacing was not included in our design.

After completing all cuts and prior to paving, we recommend the exposed subgrade soils be scarified to a depth of 9 inches, adjusted in moisture content and compacted to at least 95% of the materials standard Proctor maximum dry density. The moisture content of the scarified subgrade soils should be adjusted to be within the range of ±2% of standard Proctor optimum moisture content at the time of compaction.

Prior to paving we recommend the developed subgrade soils be proof rolled to help identify areas of instability. Unstable areas would need to be mended prior to concrete placement.

Care should be taken to avoid disturbing the reconditioned subgrade soils prior to paving. Subgrade soils which are disturbed by the construction activities or allowed to dry out or become wet and softened should be removed and replaced or reworked in place prior to concrete placement.

Alleyway Pavements

Alleyway pavements could be supported directly on stable reconditioned subgrade soils developed as outlined above. The lean clay subgrade soils would be subject to low remolded shear strength. A resistance value (R-value) of 5 was estimated for the site lean clay and used in the pavement section design. Traffic loading, reliability and serviceability loss were obtained from current Larimer County Urban Area Street Standards (LCUASS). A rigid pavement section design option is outlined below in Table I.

TABLE 1 – PAVEMENT SECTION DESIGN	
Roadway	712 West Laurel Street Alley
Roadway Classification	Residential Single Lane
ESAL's	73,000
Reliability	90%
% Loss	2.5%
Resilient Modulus (Mr)	3775
Calculated Thickness of Rigid Pavement	4.98"
PCCP Portland Cement Concrete Pavement	6" *

* Note – Minimum Thickness Required by The City of Fort Collins.

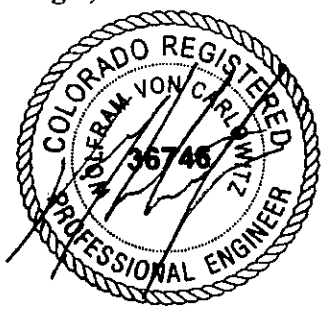
Portland cement concrete used for alleyway pavements should be air entrained and have a minimum 28-day compressive strength of 4200 psi. The proposed pavement section design does not include an allowance for excessive loading conditions imposed by heavy construction vehicles or equipment. In addition, the recommended pavement section is a minimum such that periodic maintenance efforts should be expected.

Drainage

Positive drainage is imperative for long term performance of the alleyway pavements. We recommend positive drainage be developed away from the edges of the alleyway pavements to reduce the potential for wetting of the subgrade materials. Water which is allowed to pond adjacent to alleyway pavements can result in a loss of subgrade support and premature failure of the overlying pavement section.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the enclosed information or if we can provide any further assistance, please do not hesitate to contact us.

Very Truly Yours,
Soilogic, Inc.



Wolf von Carlowitz, P.E.
Principal Engineer