KCI Construction Company, Inc.
ST. LOUIS: 10315 Lake Bluff Drive | St. Louis, MO 63123
LEBANON: 119 West Fremont | Lebanon, MO 65536

O: 314.894.8888
F: 314.894.7418
www.kciconstruction.com

SUBMITTAL TRANSMITTAL

Date Sent: 04/08/2016

Project: Webster University – Interdisciplinary Science Building

Project #: 16-008

Subject: 31 6329 Drilled Concrete Piers and Shafts – Mix Designs

Submittal ID: 0002

Type: Submittal

Purpose: For Approval

Sent Via: Email (PDF)

Transmitted To:

Devin Gates
Paric
77 Westport Plaza, Suite 250
St. Louis, MO, 63146
Phone: (636) 561-9592
Email: ddgates@paric.com

Transmitted From:

Kyle Nieman
KCI Construction Company
10315 Lake Bluff Drive
St. Louis, MO 63123
Phone: (314) 200-6486
Email: knieman@kciconstruction.com

Contents:

Qty: 1 Dated: 04/08/2016 Submittal Package No.: 0002 – 31 6329 – 00

Description: 31 6329-00_Drilled Concrete Piers and Shafts – Mix Designs

Remarks: Please review and return at your earliest opportunity. Thanks,

4/8/16

Kyle Nieman
KCI Construction Company

KCI Construction Company, Inc.
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WEBSTER UNIVERSITY – INTERDISCIPLINARY SCIENCE BUILDING

St. Louis, MO

Submittal Description: Drilled Concrete Piers and Shafts – Mix Designs

Submittal #: 0002 – 31 6329 – 00

Notes:

This submittal/drawing has been reviewed and found to be in general conformance with the contract documents.

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	

31 6329
SPEC SECTION

04/08/2016
DATE

4/8/16

KYLE NIEMAN
KCI CONSTRUCTION CO.

MIX DESIGN

Metro Materials, Inc./Western Ready-Mix, Inc.
323 Josephville Road
(Main Office)
Wentzville, MO 63385
USA 636-519-1522

Proposed Mix Proportions
50FNDSR3-5000 psi S/R/NA [0]
Strength Compressive: 5000 psi
04/06/2016

Customer : KCI Construction Co.	Contractor : KCI Construction Co.

Compressive Strength :	5000 psi at 28 days
Aggregate size :	1" -- 25 mm
Air :	1.5 ± 1.5 %
Water/Cement ratio :	0.450
Slump :	2.00 to 4.00 in
Slump after SP:	4.50 to 8.00 in

Source of Concrete : Metro Materials/Western Ready-Mix
Construction type : Drilled Piers
Placement : Conventional - Pump
Unit Weight : 148.33 pcf
Design Date : 01/31/2014

Constituents :	Quantity	Density	Volume
Type I/II Cement	450 lb	3.150	2.29
Class C Flyash	150 lb	2.700	0.89
Water (Potable Water)	270 lb	1.000	4.33
ASTM C33 #57/#67 Stone - meets both	1750 lb	2.633	10.65
MODOT Class A River Sand	1385 lb	2.630	8.44
Polychem 400NC (GRT)	4.00 floz (US)/100wt		0.00
Air	1.5 %.		0.41
Total :	4005		27.00

Remarks :

1) Aggregate weights will be adjusted when batched to compensate for free aggregate moisture.
2) Max slump before optional HRWR is 4". Max slump w/optional HRWR = 8".
3) It is the customer's responsibility to order the correct mix by the above Metro/Western Mix I.D.
4) As per ASTM C494, please forward copies of all concrete test reports to jeff.stretch@metro-materials.com

Reported by : Jeff Stretch	Approval by : _____
Date : 04/06/2016	Date : / /

Mix Design Report

Mix Analysis

Yield

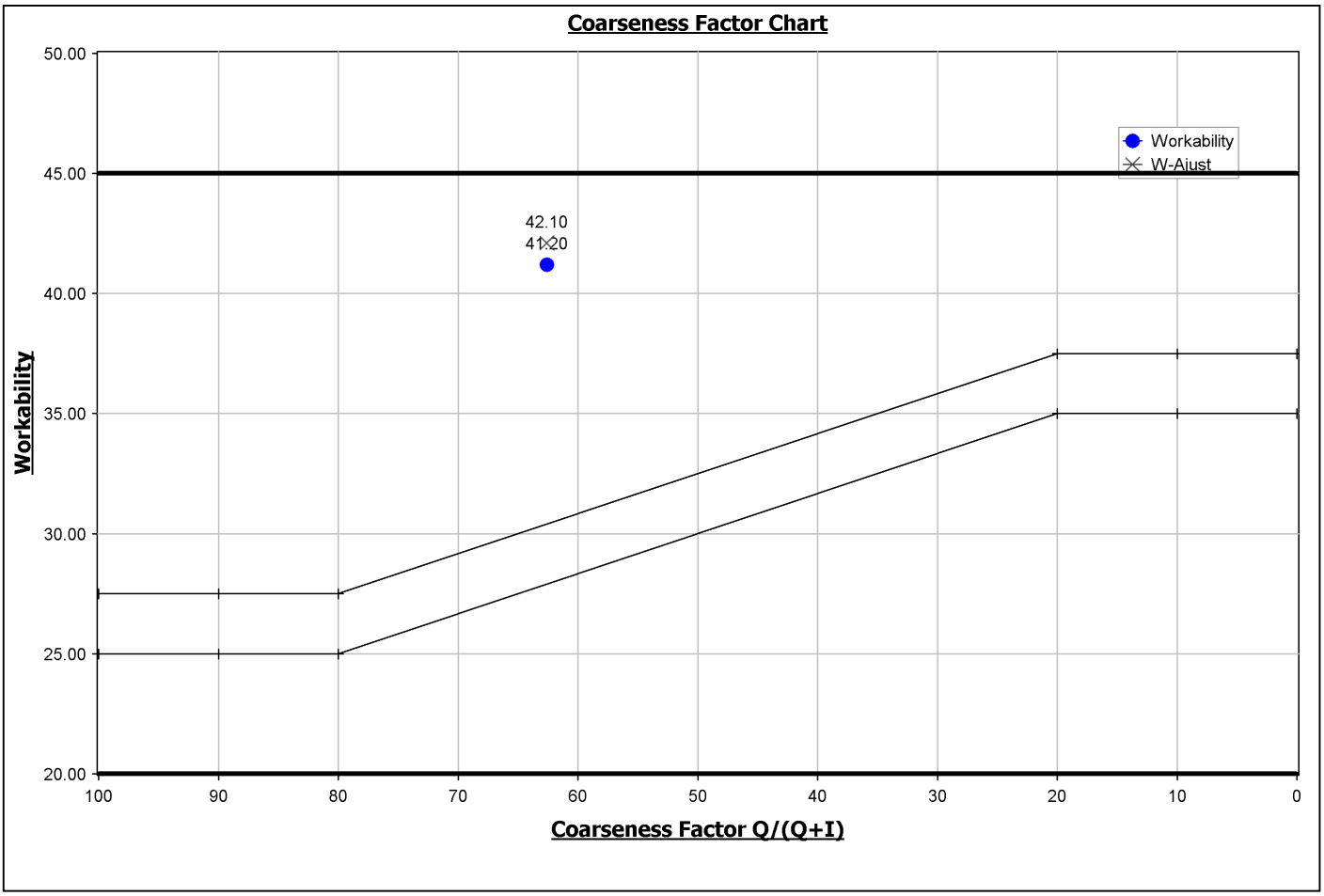
Unit Wt :	148.33
Volume :	27.00
Yield :	100.00

Mix Analysis

% Mortar :	58.5	Cag/Tag :	55.8
Q :	36.8	Tot. FM :	4.95
I :	22.0	SS-mod :	23.60
Q / Q + I :	62.6	M.S.F :	25.13
W :	41.2		
Wadj :	42.1		

Paste and Mortar

	Vol	%Total	%Agg	%Mortar	%Paste
+3/8	7.03	26.0	36.8		
3/8-#8	4.19	15.5	21.9		
+#8	11.22	41.5	58.7		
Mortar	15.79	58.5			
-#8	7.87	29.1	41.2	49.7	
Paste	7.92	29.4		50.3	
Powder	3.18	11.8		20.1	40.2
Air	0.41	1.5		2.6	5.1
Water	4.33	16.0		27.4	54.4
TOTAL	27.0	100.0	100.0	100.0	100.0



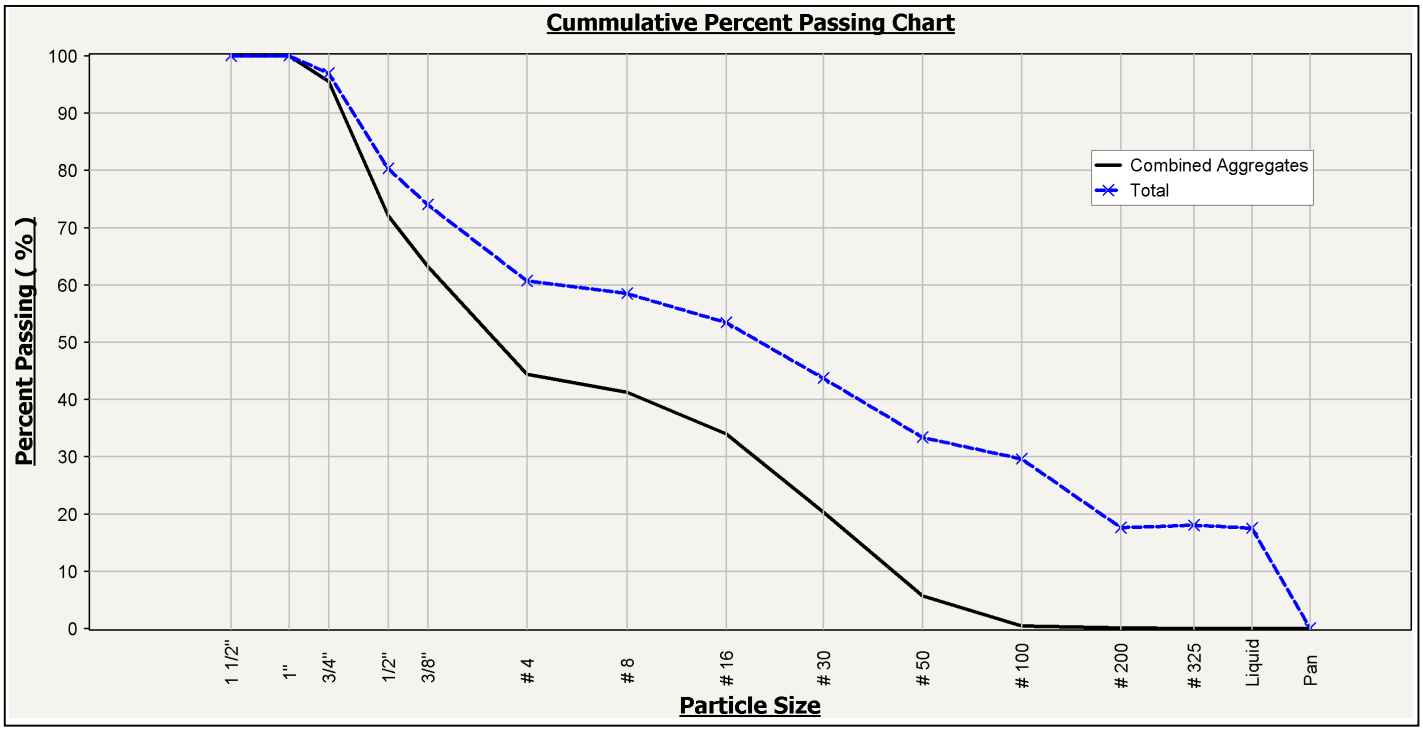
Mix Design Report

Full gradation analysis - Percent passing

Sieve	Agg. 1	Agg. 2	Agg. 3	Agg. 4	Agg. 5	Paste	Total	Aggr.
1 1/2"	100.00	100.00				100.0	100.0	100.0
1"	100.00	100.00				100.0	100.0	100.0
3/4"	92.00	100.00				100.0	96.9	95.5
1/2"	50.00	100.00				100.0	80.3	72.1
3/8"	34.00	100.00				100.0	74.0	63.2
# 4	2.00	98.00				100.0	60.7	44.4
# 8	1.00	92.00				100.0	58.5	41.2
# 16		77.00				100.0	53.4	34.0
# 30		46.00				100.0	43.7	20.3
# 50		13.00				100.0	33.4	5.7
# 100		0.90				100.0	29.6	0.4
# 200		0.20				59.8	17.6	0.1
# 325						60.0	18.0	
Liquid						59.8	17.5	
Pan								
F.M.	6.71	2.73						
% Agg	55.79	44.21						
% Total	39.45	31.26				29.3		

Agg. 1 : ASTM C33 #57/#67 Stone - meets…

Agg. 2 : MODOT Class A River Sand



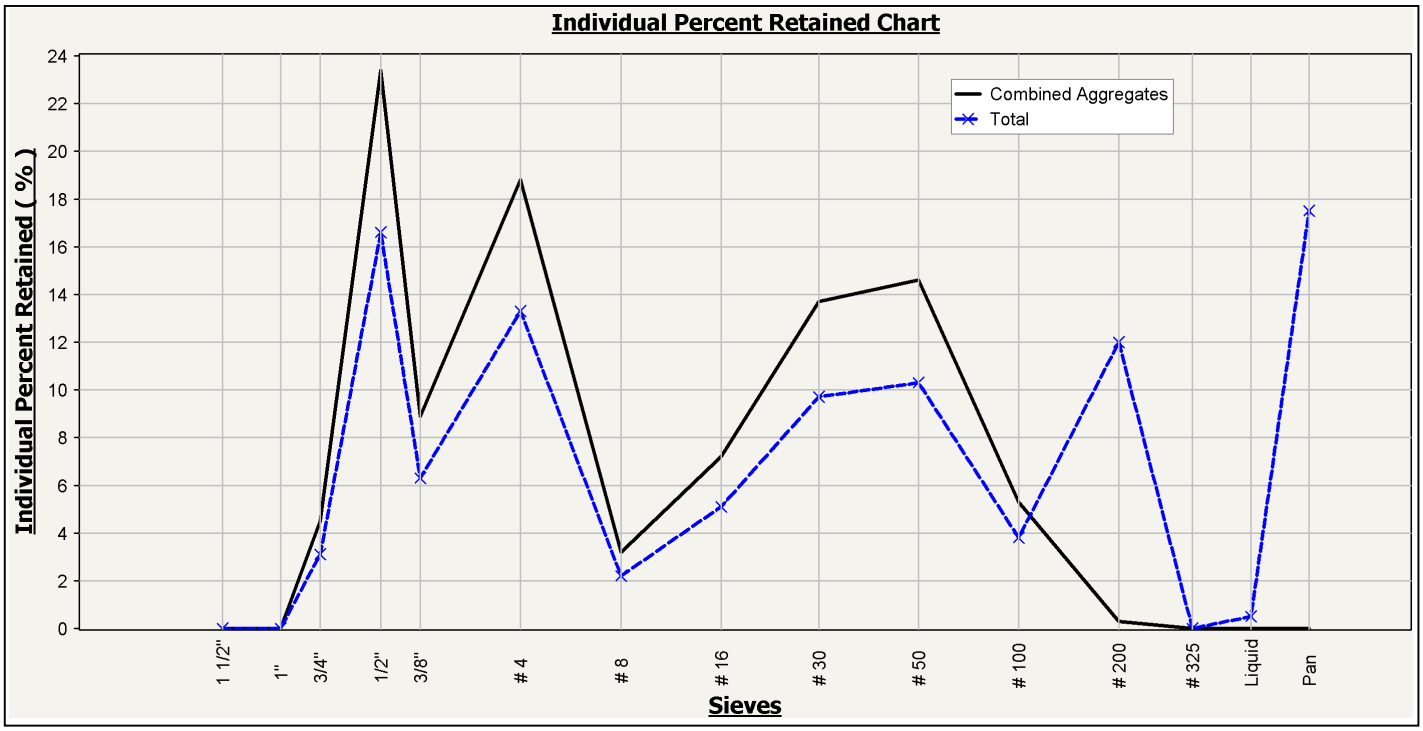
Mix Design Report

Full gradation analysis - Individual percent retained

Sieve	Agg. 1	Agg. 2	Agg. 3	Agg. 4	Agg. 5	Paste	Total	Aggr.
1 1/2"								
1"								
3/4"	8.00						3.1	4.5
1/2"	42.00						16.6	23.4
3/8"	16.00						6.3	8.9
# 4	32.00	2.00					13.3	18.8
# 8	1.00	6.00					2.2	3.2
# 16	1.00	15.00					5.1	7.2
# 30		31.00					9.7	13.7
# 50		33.00					10.3	14.6
# 100		12.10					3.8	5.3
# 200		0.70				40.20	12.0	0.3
# 325						-0.20		
Liquid						0.20	0.5	
Pan						59.80	17.5	
F.M.	6.71	2.73						
% Agg	55.79	44.21						
% Total	39.45	31.26						

Agg. 1 : ASTM C33 #57/#67 Stone - meets…

Agg. 2 : MODOT Class A River Sand



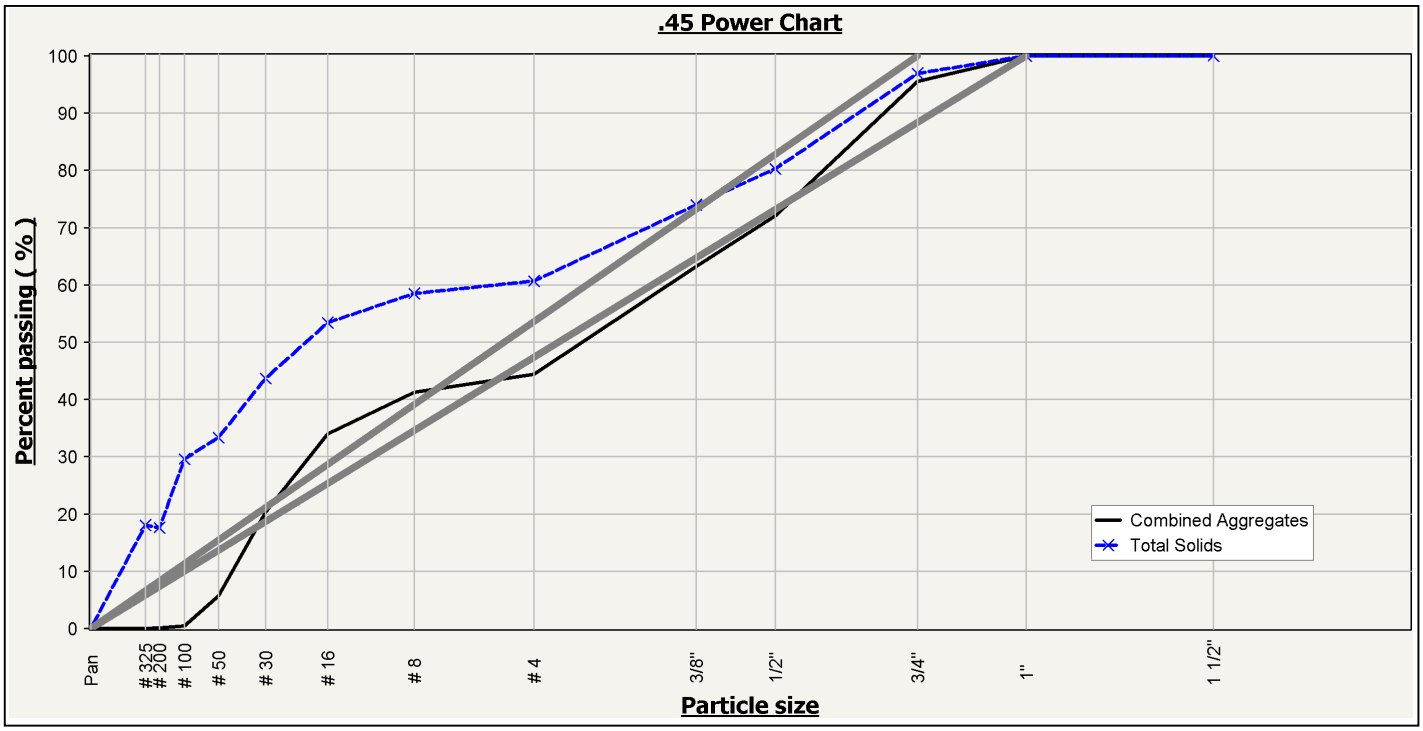
Mix Design Report

Full gradation analysis - Percent passing

Sieve	Agg. 1	Agg. 2	Agg. 3	Agg. 4	Agg. 5	Paste	Total	Aggr.
1 1/2"	100.00	100.00				100.0	100.0	100.0
1"	100.00	100.00				100.0	100.0	100.0
3/4"	92.00	100.00				100.0	96.9	95.5
1/2"	50.00	100.00				100.0	80.3	72.1
3/8"	34.00	100.00				100.0	74.0	63.2
# 4	2.00	98.00				100.0	60.7	44.4
# 8	1.00	92.00				100.0	58.5	41.2
# 16		77.00				100.0	53.4	34.0
# 30		46.00				100.0	43.7	20.3
# 50		13.00				100.0	33.4	5.7
# 100		0.90				100.0	29.6	0.4
# 200		0.20				59.8	17.6	0.1
# 325						60.0	18.0	
Liquid						59.8	17.5	
Pan								
F.M.	6.71	2.73						
% Agg	55.79	44.21						
% Total	39.45	31.26				29.3		

Agg. 1 : ASTM C33 #57/#67 Stone - meets…

Agg. 2 : MODOT Class A River Sand



Metro Materials, Inc./Western Ready-Mix, Inc.
323 Josephville Road (Main Office)
Wentzville, MO 63385 USA

ACI 318 Overdesign Report of 50FNDSR3 - 5000 psi S/R/NA

ACI 318 Overdesign Report

Statistical Strength Summary

Target strength at 28 days	:	5000 psi
Average strength based on 16 tests	:	7172 psi
Overall Standard Deviation	:	766 psi
Poor		
Overall coefficient of variation	:	10.68 %
Overall within-test coefficient of variation	:	2.92 %
Excellent		
ACI 318 Minimum Recommended Strength	:	6284 psi

Average strength > minimum recommended strength by 888 psi

Performance History
Metro Materials, Inc./Western Ready-Mix, Inc.
323 Josephville Road (Main Office)
Wentzville, MO 63385 USA
50FNDSR3 - 5000 psi S/R/NA

Cast date	Sample ID	Slump	% Air	Conc Temp	7 Day PSI	28 Day PSI	Avg 3 - 28 Day	
04/01/2015	32	8.00	2.2	65	5870	7035	0.0	
04/24/2015	57	7.50	1.9	70	5870	7035	0.0	
04/24/2015	58	6.50	2.0	70	6400	7985	7351.7	
04/29/2015	62	7.00	2.1	71	5580	7250	7423.3	
04/29/2015	63	7.50	1.7	75	5610	7595	7610.0	
05/05/2015	67	6.75	1.6	78	5680	7110	7318.3	
05/06/2015	70	7.75	1.5	82	5080	6245	6983.3	
05/06/2015	71	8.00	1.5	83	5180	6090	6481.7	
05/14/2015	76	5.00	2.3	76	5610	6935	6423.3	
05/14/2015	77	7.25	1.9	73	5620	7075	6700.0	
05/18/2015	78	5.50	1.9	84	5440	7195	7068.3	
05/21/2015	80	4.75	2.0	72	6650	8450	7573.3	
05/28/2015	4	6.25	2.1	76	4700	6595	7413.3	
06/02/2015	5	4.50	1.5	76	5960	8240	7761.7	
06/03/2015	6	5.25	2.2	82	6010	8100	7645.0	
06/10/2015	10	5.00	2.4	88	4100	5815	7385.0	
		6.410	1.90	76.0	5585.0	7171.9		Averag
		1.238	0.29	6.2	617.6	765.6		STD
		4.50	1.5	65	4100	5815		Low
		8.00	2.4	88	6650	8450		High

Number of observations: 16

Material Certification Report

Material:	Portland Cement	Test Period:	01-Feb-2016
Type:	I-II	To:	29-Feb-2016

Certification

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

General Information

Supplier:	Holcim (US) Inc.	Source Location:	Ste. Genevieve Plant
Address:	2942 US Highway 61 Bloomsdale, MO 63627		2942 US Highway 61 Bloomsdale, MO 63627
Telephone:	636-524-8155	Contact:	Erin Watson
Date Issued:	11-Mar-2016		

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[A]**	**Result**	**Item**	**Limit[A]**	**Result**
SiO_2 (%)	-	19.7	Air Content (%)	12 max	5
Al_2O_3 (%)	6.0 max	4.4	Blaine Fineness (m^2/kg)	260 min	392
Fe_2O_3 (%)	6.0 max	3.2			
CaO (%)	-	64.5			
MgO (%)	6.0 max	2.4	Autoclave Expansion (%) (C151)	0.80 max	0.04
SO_3 (%)	3.0 max[B]	3.5	Compressive Strength MPa (psi):		
Loss on Ignition (%)	3.0 max	2.6			
Insoluble Residue (%)	0.75 max	0.43	3 days	12.0 (1740) min	28.3 (4110)
CO_2 (%)	-	1.4	7 days	19.0 (2760) min	35.6 (5160)
Limestone (%)	5.0 max	3.6			
$CaCO_3$ in Limestone (%)	70 min	89	Initial Vicat (minutes)	45-375	86
Inorganic Processing Addition (%)	5.0 max	0.0			
Potential Phase Compositions[C]:			Mortar Bar Expansion (%) (C1038)	-	0.013
C_3S (%)	-	63			
C_2S (%)	-	6			
C_3A (%)	8 max	6			
C_4AF (%)	-	9			
$C_3S + 4.75C_3A$ (%)	-	91.3			

Tests Data on ASTM Optional Requirements

Chemical			Physical		
Item	**Limit[A]**	**Result**	**Item**	**Limit[A]**	**Result**
Equivalent Alkalies (%)	0.60 max	0.53	False Set (%)	50 min	77

Notes

[A] Dashes in the limit / result columns mean Not Applicable.

[B] It is permissible to exceed the specification limit provided that ASTM C1038 Mortar Bar Expansion does not exceed 0.020 % at 14 days.

[C] Adjusted per Annex A1.6 of ASTM C150 and AASHTO M85.

[D] Test result represents most recent value and is provided for information only. Analysis of Heat of Hydration has been carried out by CTLGroup, Skokie, IL.
Equavalent Alkalies (%) Minimum = 0.47, Maximum = 0.59
This data may have been reported on previous mill certificates.

Additional Data

Inorganic Processing Addition Data		Base Cement Phase Composition	
Item	**Result[A]**	**Item**	**Result**
Type	-	C_3S (%)	65
Amount (%)	-	C_2S (%)	6
SiO_2 (%)	-	C_3A (%)	6
Al_2O_3 (%)	-	C_4AF (%)	10
Fe_2O3 (%)	-		
CaO (%)	-		
SO_3 (%)	-		

By , Quality Manager

Analytical Testing Service Laboratories, Inc.
P.O. Box 1118, Joplin, Missouri 64802
(417) 782-6573

Mineral Resource Tech. Inc., A CEMEX Co.
929 Gessner, Suite 1900 Houston
Houston, Texas 77024
1-813-671-2266 ext.114

January 27, 2016

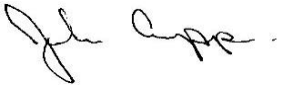
Attn: Oscar Jaramillo

Re: 55893 - Labadie Fly Ash Sample - 3200 Ton Composite - Silo C - 11/ 30-12/09 /2015

	AASHTO-M295 Class "C" Requirements	ASTM C-618 Class "C" Requirements	Actual
Fineness (+325 Mesh)	34% Max	34% Max	13.90%
Fineness Variation	5.0% Max	5.0% Max	0.20%
Moisture Content	3% Max	3% Max	0.08%
Density g/cm^3 C188	****	****	2.75
Density Variation	5.0% Max	5.0% Max	1.09%
Loss on Ignition	5% Max	6% Max	0.29%
Soundness	0.8% Max	0.8% Max	0.03%
S.A.I., 7 Days	75% Min	75% Min	102.00%
S.A.I., 28 Days	75% Min	75% Min	108.70%
Water Req. % Control	105% Max	105% Max	94.20%
Silica SiO_2	****	****	35.10%
Aluminum Oxide Al_2O_3	****	****	21.54%
Ferric Oxide Fe_2O_3	****	****	6.01%
Total	50% Min	50% Min	62.65%
Sulfur Trioxide SO_3	5% Max	5.0% Max	1.61%
Calcium Oxide CaO	****	****	25.88%
Magnesium Oxide MgO	****	****	5.97%
Available Alkalies Na_2O	1.50%Max	****	1.24%

We certify the above was tested in accordance with ASTM C-618 & AASHTO-M295

Analytical Testing Service Laboratories, Inc.



John K. Cupp, Manager

MoDOT

Missouri Department of Transportation

Greg Horn
St. Louis District Engineer

1590 Woodlake Drive
Chesterfield, Missouri 63017-5712
314.275.1500
Fax: 573.522.6475
1.888.ASK MODOT (275.6636)

March 4, 2015

Mr. Mark Simpson
Simpson Quarries
Barnhart, Missouri

Ledges 3,4,5 have been submitted for source approval.

Laboratory tests indicate that the material representing these ledges (ID# 14SLKRM070) complies with Specification 1005 coarse aggregate for PCCP. T-161 testing by Bowser-Morner.

Sincerely,

Digitally signed by Mark Simon
DN: cn=Mark Simon, o=MoDOT, ou, email=mark.simon@modot.mo.gov, c=US
Date: 2015.03.05 12:26:58 -06'00'

Mark Simon, R.G.
Geologist

Copy: Kevin McLain-cm
Material Survey File

Simpson Barnhart Quarry
PS#: 3049900316

QUARRY LEDGE INFORMATION SUMMARY - Source

Mar 4, 2015

Simpson Quarry, Barnhart PH# ( ) -

Barnhart County

LL 090 22 40 038 20 00 PS#: 3049900316

Ledge	Formation/ Member	Description/Components					MoDOT			
	Lab ID#	Date	LA	SPG	Abs	Unit Weight	T14	T104	T161
1-5	Kimmswick									
100510..CPCMLD	14SLKRM095	2014 1202	43	2.570	1.6	97	1.4	4	
3,4,5	Kimmswick Material represents Kimmswick formation, ledges 3,4,5. Sample complies with Specification 1005 coarse aggregate for PCCP. T-161 testing by Bowser-Morner.								
100510..CPCMLD	14SLKRM070	2014 1028	41	2.585	1.5	98	3.2	9	98
3,4,5	Kimmswick Material represents Kimmswick formation, ledges 3,4,5. Sample complies with Specification 1005 coarse aggregate for PCCM.								
1005CM..LD10	14SLKRM071	2014 1028	41	2.585	1.5	98	3.2	9	
6	Decorah Group								
100510..CPCMLD	14SLKRM096	2014 1202	26	2.594	1.8	98	19.0 18.4	33 36	

STATE OF MISSOURI
MARK SIMON
RG
REGISTERED GEOLOGIST

1- of -1 Signed (Seal)

Revised 9/20/13

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Road • Dayton, Ohio 45424 **Mailing Address:** P. O. Box 51 • Dayton, Ohio 45401

AASHTO/ISO 17025 Accredited • USACE Validated

LABORATORY REPORT

Report To: Simpson Construction Materials, LLC.
Attn: Mark Simpson
1053 Headquarters Park Drive
Fenton, MO 63026

Report Date: December 16, 2014
Job No.: 168165
Report No.: 110513B
No. of Pages: 3

Report On: Laboratory Analysis of One MoDOT Grade D Crushed Limestone Sample
Kimmswick Ledges 3,4,5 Combination

On October 29, 2014, one sample of MoDOT Grade D crushed limestone was submitted for selected laboratory analysis. Testing was performed as specified by the client and in accordance with the following procedures:

ASTM C 88, "Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate".

ASTM C 117, "Material Finer Than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing".

ASTM C 127, "Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate".

ASTM C 131, "Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine".

ASTM C 136, "Sieve Analysis of Coarse Aggregate".

Results are detailed on the attached data sheets.

Should you have any questions, or if we may be of further service, please contact me at (937) 236-8805, extension 322.

Respectfully submitted,
BOWSER-MORNER, INC.

Karl A. Fletcher, Manager
Construction Materials and
Geotechnical Laboratories

KAF/gls/ksp
110513B
1-File
1-mts@simpsonmaterials.com

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Sample ID: MoDOT Grade D Crushed Limestone

TABLE I
Sieve Analysis and Decantation (ASTM C 136, C 117)

Sieve Size	Percent Passing	MoDOT 1005.2.4 Gradation D Specifications, % Passing
1"	**100**	100
3/4"	**98**	85-100
1/2"	**67**	---
3/8"	**36**	15-55
No. 4	**6**	0-10
No. 8	**4**	---
No. 200 Decant, %:	**1.0**	2.5

Report To: Simpson Construction Materials, LLC
Date Received: 10-29-14
Ledges: Kimmswick Ledges 3,4,5 Combination

BMI Job No.: 168165
BMI Report No.: 110513A

Sample ID: MoDOT Grade D Crushed Limestone

TABLE II
Summary of Results

Test Parameter	Test Method	Result	Specifications, % Max.		
			ASTM C33 5S	MoDOT 1005.2.1.2 (a)	MoDOT 1005.2.1.2 (b)
Los Angeles Abrasion - Grading B, %:	ASTM C 131	**47.3**	50	50	50
Sodium Sulfate Soundness, %:	ASTM C 88	**6.6**	12	---	---
Bulk Dry Specific Gravity:	ASTM C 127	**2.593**	---	---	---
Bulk SSD Specific Gravity:	ASTM C 127	**2.628**	---	---	---
Apparent Specific Gravity:	ASTM C 127	**2.686**	---	---	---
Absorption, %:	ASTM C 127	**1.3**	---	---	3.5

TABLE III
Sodium Sulfate Soundness (ASTM C 88) - Detailed by Size Fraction

Size Fraction	Percent Loss	Gradation Factor	Weighted Percent Loss	ASTM C 33 Class 5S Specification, % Max.
3/4" to 1/2"	5.35	0.329	1.76	---
1/2" to 3/8"	7.87	0.312	2.46	---
3/8" to No. 4	6.56	0.359	2.36	---
Total	---	---	**6.6**	12

MoDOT 1005.2.1.2 (a): Portland Cement Concrete Pavement
MoDOT 1005.2.1.2 (b): Portland Cement Concrete Masonry

BOWSER-MORNER, INC.

Delivery Address: 4518 Taylorsville Road • Dayton, Ohio 45424 **Mailing Address:** P. O. Box 51 • Dayton, Ohio 45401

AASHTO/ISO 17025 Accredited

LABORATORY REPORT

Report To: Simpson Construction Materials, LLC
Attn: Tom Simpson
P.O. Box 250
Valley Park, MO 63088

Report Date: February 24, 2014
Job No.: 168165
Report No.: 200029A
No. of Pages: 4

Report On: Rapid Freeze Thaw Testing of One Crushed Limestone Sample
Sample ID: MoDOT Grade D Stone; Ledge 3-5; Kimmswick Formation

On October 29, 2014 one sample of crushed limestone was submitted for freeze-thaw durability analysis. Testing was performed as specified by the client and in accordance with the following procedures.

ASTM C 215-97, "Fundamental Transverse, Longitudinal, and Torsional Frequencies of Concrete Specimens".

AASHTO T 161, "Resistance of Concrete to Rapid Freezing and Thawing", Method B.

MoDOT T 67, "Preparation of Concrete for Use in AASHTO T 161 Freeze Thaw Durability".

Results are summarized below and detailed on the attached data sheets.

Parameter	Results	MoDOT 1005 Specification, % Min.
Average Length Change at 300 Cycles, %:	**0.0051**	---
Relative Dynamic Modulus of Elasticity, %:	**97.8**	---
Aggregate Durability Factor:	**97.8**	75

Should you have any questions, or if we may be of further service, please contact me at (937) 236-8805, extension 329.

Respectfully submitted,
BOWSER-MORNER, INC.

Karl A. Fletcher, Manager
Construction Materials and
Geotechnical Laboratories

KAF/llg
200029A
1-File
1-mts@simpsonmaterials.com

All Reports Remain The Confidential Property Of BOWSER-MORNER And No Publication Or Distribution Of Reports May Be Made Without Our Express Written Consent, Except As Authorized By Contract. Results Contained In This Report Are Reflective Only of The Items Calibrated or Tested. Unless Otherwise Agreed, Samples Or Specimens Will Be Discarded Or Returned At Bowser-Morner's Discretion. AASHTO/ISO 17025 Accreditation applies only to the parameters included in BOWSER-MORNER'S current scope of accreditation. Go to www.bowser-morner.com/accreditations for reviews.

Batch Parameters

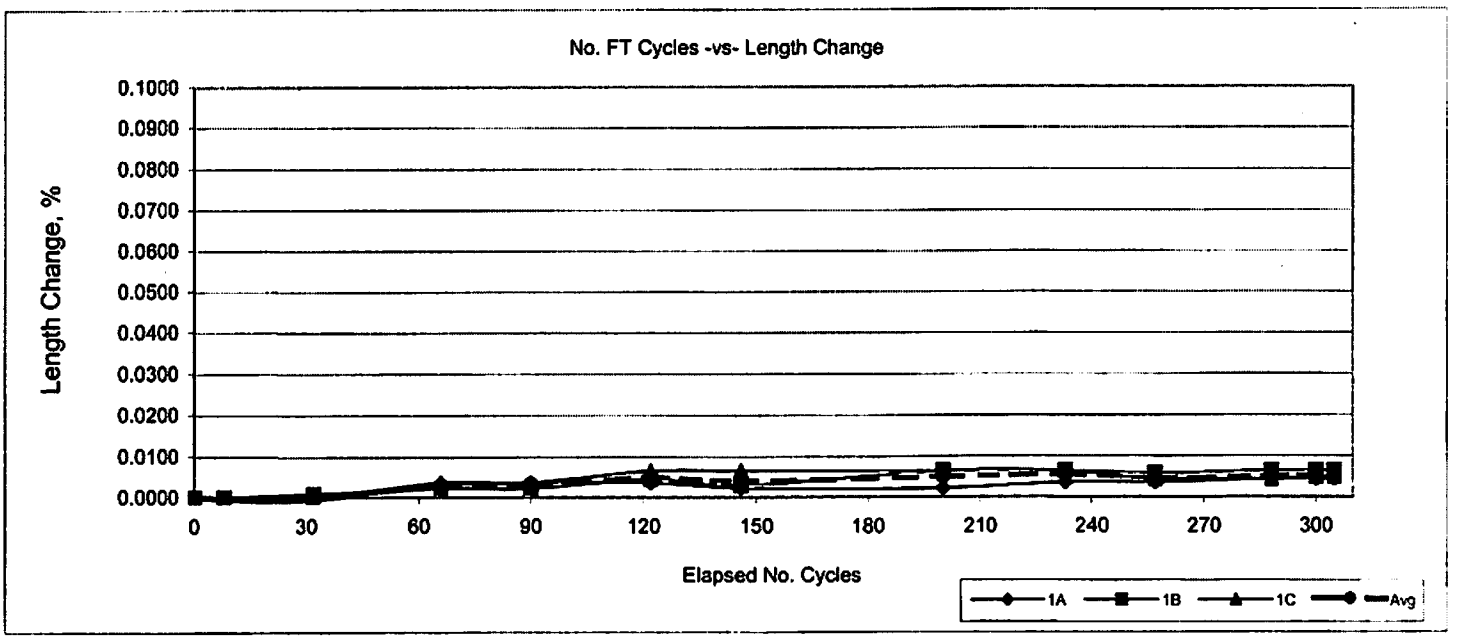
Material	Parameter	
Natural Sand	Bulk Dry Gs	**2.609**
	Bulk SSD Gs	**2.619**
	Absorption, %	**0.42**
MoDOT Grade D Crushed Limestone Ledge 3-5	Bulk Dry Gs	**2.590**
	Bulk SSD Gs	**2.629**
	Absorption, %	**1.49**
Batch Weights (1.5 cu. ft.)	Cement, lbs.	**33.9**
	Water, lbs.	**13.6**
	CA, lbs.	**100.1**
	FA, lbs.	**65.9**
	Entrained Air, %	**6.4**
	Slump, inches.	**2**
	Unit Weight, pcf.	**142.9**
	W/C Ratio	**0.40**
	Cement Factor	**613**
Flexural Strength	35 Days of Age, psi:	**760**
	After F/T Testing, psi:	**780**

SIMPSON CONSTRUCTION MATERIALS, INC

ASTM C 666, Method B "Resistance of Concrete to Rapid Freezing and Thawing" (MODOT)

Effective Gage Length, in. 14.00 **Sample ID: MODOT 'D' Stone; Ledge 3-5; Kimmswick**

No.	Cycle No.	Expansion, inches			No. of Cycles	Expansion, %			
		1A	1B	1C		1A	1B	1C	Avg
1	877	0.0811	0.0818	0.0717	0	0.0000	0.0000	0.0000	0.0000
2	885	0.0810	0.0818	0.0717	8	-0.0007	0.0000	0.0000	-0.0002
3	909	0.0810	0.0819	0.0717	32	-0.0007	0.0007	0.0000	0.0000
4	943	0.0815	0.0821	0.0722	66	0.0029	0.0021	0.0036	0.0029
5	967	0.0816	0.0821	0.0722	90	0.0036	0.0021	0.0036	0.0031
6	999	0.0816	0.0824	0.0726	122	0.0036	0.0043	0.0064	0.0048
7	1023	0.0814	0.0822	0.0726	146	0.0021	0.0029	0.0064	0.0038
8	1077	0.0814	0.0827	0.0726	200	0.0021	0.0064	0.0064	0.0050
9	1110	0.0816	0.0827	0.0726	233	0.0036	0.0064	0.0064	0.0055
10	1134	0.0816	0.0826	0.0723	257	0.0036	0.0057	0.0043	0.0045
11	1165	0.0817	0.0827	0.0723	288	0.0043	0.0064	0.0043	0.0050
12	1182	0.0817	0.0827	0.0724	305	0.0043	0.0064	0.0050	0.0052
					300	0.0043	0.0064	0.0048	**0.0051**

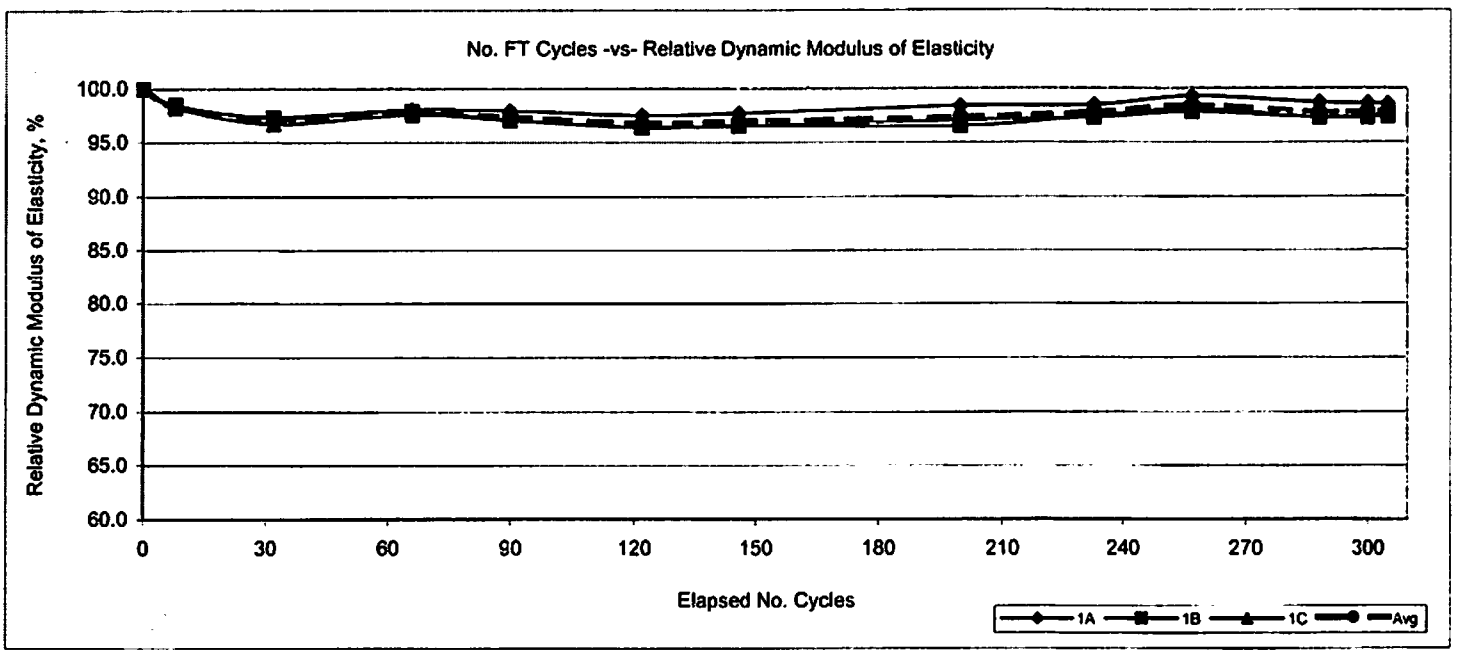


SIMPSON CONSTRUCTION MATERIALS, INC

ASTM C 215, "Fundamental Transverse, Longitudinal, and Torsional Resonant Frequencies of Concrete Specimens"

Termination Cycle: 300 **Sample ID: MODOT 'D' Stone; Ledge 3-5; Kimmswick**

No.	Cycle No.	Fundamental Transverse Frequency, Hz			No. of Cycles	Relative Dynamic Modulus of Elasticity, %			
		1A	1B	1C		1A	1B	1C	Avg
1	877	1802	1822	1802	0	100.0	100.0	100.0	100.0
2	885	1786	1808	1786	8	98.2	98.5	98.2	98.3
3	909	1778	1797	1772	32	97.4	97.3	96.7	97.1
4	943	1784	1802	1780	66	98.0	97.8	97.6	97.8
5	967	1783	1795	1775	90	97.9	97.1	97.0	97.3
6	999	1779	1788	1769	122	97.5	96.3	96.4	96.7
7	1023	1781	1790	1770	146	97.7	96.5	96.5	96.9
8	1077	1787	1790	1775	200	98.3	96.5	97.0	97.3
9	1110	1788	1798	1777	233	98.5	97.4	97.2	97.7
10	1134	1795	1804	1782	257	99.2	98.0	97.8	98.4
11	1165	1790	1797	1777	288	98.7	97.3	97.2	97.7
12	1182	1789	1800	1778	305	98.6	97.6	97.4	97.8
					300	98.6	97.5	97.3	**97.8**



LOADOUT SAMPLES **STATE CONCRETE** **AGGREGATE GRADATION REPORT** **MODOT**

1005 CLASS A **RIVER SAND** **027FA01** **BUSSEN QUARRY (KOCH)** FINE AGGREGATE FOR CONCRETE

MIN							*IDOT*	94	78	45	26	3	0		**ASTM C 33 FINE AGGREGATE**
MAX	**Seq**	Test	Type	Samp			**100**	**100**	**100**	**85**	**52**	**29**	**10**	**6.0**	**'0.3 ABS. 2.62 SP.GR.**
DATE	**No**	By	Test	From	**W/D**		**3/8**	**4**	**8**	**16**	**30**	**50**	**100**	**-200**	**111 lbs./ cu. Ft.**
															REMARKS
42909	9	QC	PRO	SP	W		100	99	96	82	40	6	0	0.2	
52609	12						100	99	91	76	44	10	2	0.2	HIGH WATER
62209	14						100	99	91	74	39	8	1	0.2	
81409	17						100	99	94	80	49	13	2	0.3	
92509	21						100	99	94	79	41	10	1	0.2	IDOT QUALITY SAMPLE
102809	23						100	99	92	84	50	11	1	0.1	0.5ABS, 2.609DRY, 2.621SSD,
111009	27						100	99	92	74	35	7	1	0.1	
31910	2						100	99	94	80	43	9	1	0.1	
41210	4						100	99	94	78	36	7	1	0.1	IDOT split
52410	7						100	99	93	78	42	8	1	0.1	
60410	9						100	99	93	78	44	9	1	0.1	
72110	13						100	99	95	84	54	11	1	0.2	
82410	15	"					100	98	90	74	34	7	1	0.2	
92710	17						100	99	93	78	42	11	1	0.1	
102910	21						100	99	94	82	48	13	2	0.2	
111810	23						100	99	93	77	37	8	1	0.1	
12411	1						100	99	93	78	40	11	1	0.2	START 2011
22111	4						100	98	91	76	39	10	1	0.2	
33011	8						100	99	93	81	48	14	3	0.2	
42911	11						100	99	92	78	45	11	2	0.1	
52511	14						100	99	94	79	37	6	1	0.1	
62311	16						100	99	94	82	46	11	2	0.2	
82511	20						100	99	93	78	37	12	1	0.2	
92811	22						100	99	94	79	40	14	1	0.3	
102111	26						100	99	95	76	31	9	1	0.1	
120211	29						100	98	92	77	44	14	1	0.2	
12512	33						100	100	96	84	42	9	1	0.1	
31912	36						100	99	94	79	40	11	1	0.1	109#, 2.631BULK(T84), 0.2 %
42012	38						100	99	94	77	35	4	1	0.1	START 2012 PRODUCTION'3/29
50112	42						100	100	96	82	38	8	1	0.1	
62012	44						100	100	95	78	33	7	1	0.1	
70212	47						100	99	93	76	31	6	1	0.1	
80612	51						100	99	93	78	40	13	1	0.1	
92012	53						100	99	94	76	37	10	1	0.1	NORTH LOADOUT
111312	56						100	100	95	79	35	7	1	0.1	
20113	3						100	100	96	84	42	12	0	0.1	IDOT 2013
53113	**5**						**100**	**99**	**94**	**79**	**41**	**9**	**1**	**0.1**	DSP.GR 2.601, SSD SP.GR. 2.610
71913	**8**						**100**	**99**	**91**	**74**	**39**	**10**	**1**	**0.1**	ABS. 0.4%, TOTAL DELT. = 0.1%
81513	**12**						**100**	**98**	**87**	**66**	**28**	**12**	**1**	**0.1**	
110408	32						100	100	94	79	38	7	1	0.1	
112108	33						100	98	90	75	42	15	2	0.1	
122908	37						100	99	89	71	45	15	1	0.1	
12609	2						100	99	90	70	32	7	1	0.1	2009
31209	4						100	100	94	77	36	5	0	0.1	TOP
MODOT	SPEC.						100	95-100	70-100	45-90	15-65	5-30	0-10	2.0 MAX	
44 AVERAGE GRAD.						0	100	99	93	78	40	10	1	0.1	

GRT
ADMIXTURES
FOR CONCRETE

Polychem 400 NC

Water Reducing Admixture

Polychem 400 NC is a normal setting, multi-component, highly concentrated, water reducing admixture conforming to ASTM C 494 Type A.

Polychem 400 NC will reduce the quantity of water required to produce concrete of a desired consistency, while providing greater economy for a given strength. It will increase strengths and improve workability and finishing characteristics.

Polychem 400 NC does not contain calcium chloride, and is compatible with air-entrained or non air-entrained mixes.

Applicable Standards

General Resource Technology **Polychem 400 NC** meets and will exceed the requirements of ASTM C 494, Type A CRD C 87, AASHTO M 194.

Independent laboratory tests are available upon request.

Advantages

Plastic Concrete

- Reduced mix water requirement needed to produce a given slump or consistency (reduced water/cementitious ratio)
- Reduced cracking and shrinkage
- Improved workability
- Will not retard the rate of set when used at recommended dosage rates

Hardened Concrete

- Increased compressive and flexural strengths
- Reduced cracking and shrinkage
- Reduced permeability and increased water-tightness
- Increased freeze-thaw resistance
- Superior surface appearance

Dosage Rates

3 to 5 oz. per 100 lbs. cementitious material.

Technical Service

General Resource Technology has trained representatives as well as technical consultants available to all specifiers and users to assist with field use and promotion, specifications, and dispenser services. General Resource Technology highly recommends that these services be utilized to ensure maximum performance and benefits while using **Polychem 400 NC**.

Compatibilty

Polychem 400 NC is compatible with approved air entrainment admixtures, calcium chloride, stearates and similar chemical derivatives.
Polychem 400 NC does not itself entrain air significantly.

Specification Suggestions

All concrete shall contain **Polychem 400 NC**, ASTM C494, Type A normal setting water reducer, produced by General Resource Technology, Eagan, MN. Suggested dosage rate shall be 3-5oz. per 100 wt. of cementitious material unless otherwise recommended by General Resource Technology Technical Services.

General Resource Technology, Inc. ■ 2978 Center Court ■ Eagan, Minnesota 55121-1257
Sales: (800) 324-8154 ■ Corporate: (651) 454-4151 ■ Fax: (651) 454-4252
Visit our Web Site: www.grtinc.com

Polychem 400NC

Water Reducing Admixture

AVAILABILITY

Polychem 400 NC is available in bulk or 55 gallon drums.

General Resource Technology will install, service and maintain dispenser systems for bulk admixture purchasers.

WARRANTY

General Resource Technology warrants **Polychem 400 NC** to be free from defects in materials and manufacture. General Resource Technology is not responsible for conditions outside it's control, including other materials, workmanship, design, inspection, supervision, labor, ambient temperature and field conditions, which are the proper responsibility of others.

HANDLING

Polychem 400NC is a polymeric blend of raw materials which have been found to be environmentally safe. **Polychem 400 NC** can be used at temperatures as low as 23°F. Care should be exercised to prevent freezing below this temperature; freezing will not damage **Polychem 400 NC** if thawed and agitated. MSDS availlable.

GENERAL RESOURCE TECHNOLOGY

Melchem

Superplasticizer

MELCHEM is a water-soluble melamine based high-range water reducing admixture. (Superplasticizer)

MELCHEM can reduce mixing water up to 30%, producing high strength, low water/cement ratio concrete which can be placed at normal levels of workability or it can be added to a mix to produce flowing concrete with increased strength.

MELCHEM is chloride-free and non-corrosive.

MELCHEM is recommended for use in all concretes, especially reinforced/ prestressed and post-tensioned concretes.

Applicable Standards

General Resource Technology's **MELCHEM** is manufactured and conforms to the specifications of ASTM C 494, Type A and F, and AASHTO M 194.

Advantages

Ready-Mix Industry Benefits

- Workability is increased with no loss of strength.
- Desired strengths can be obtained with less cement and without the loss of workability.
- Recommended for concrete to be pumped or tremied.
- Cohesion of mix is improved.
- Shrinkage cracking is reduced.
- Reduced labor needed for placement, truck turnaround is faster.

Prestressed/Precast Industry Benefits

- Early strength is accelerated and allows for early release of beds.
- Reduced surface voids.
- Type I cement may be used in place of Type III.
- Cracking is reduced.
- Increased use of forms.

Hardened Concrete

- Reduced shrinkage.
- Reduced permeability and increased durability.
- Increased early and ultimate strengths.

Dosage Rates

MELCHEM dosage rate will vary depending upon the amount of water-reduction and workablity desired.

Flowing Concrete Applications:

6-18 oz per 100 wt. of cementitious material. Job site added to concrete with a 2" slump minimum and completely mixed, then placed.

Prestressed/Precast applications:

6-25 oz per 100 wt of cementious material, added with the mixing water.

Technical Service

General Resource Technology has trained representatives as well as technical consultants available to all specifiers and users to assist with field use and promotion, specifications, and dispenser services. General Resource Technology highly recommends that these services be utilized to ensure maximum performance and benefit while using **MELCHEM**.

General Resource Technology, Inc. ■ 2978 Center Court ■ Eagan, Minnesota 55121-1257
Sales: (800) 324-8154 ■ Corporate: (651) 454-4151 ■ Fax: (651) 454-4252
Visit our Web Site: www.grtinc.com

Melchem

Superplasticizer

Compatibilty

MELCHEM in both air-entrained and non air-entrained concrete is compatible with Portland cement, fly ash, microsilica, calcium chloride, and fibers. Controlled retardation of setting time can be achieved by varying dosages of water-reducing or set-controlling agents used in conjunction with **MELCHEM**. Caution should be exercised when using **MELCHEM** in combination with water-reducing admixtures at temperatures below 65°F.

Specification Suggestions

All concrete shall contain **MELCHEM**, ASTM C-494 Type A and F, for site-added flowing concrete/or all concrete shall use **MELCHEM** to reduce the water/cement ratio and provide workable concrete.

Availability

MELCHEM is available in bulk or 55 gallon drums.

General Resource Technology will install, service, and maintain dispenser systems for bulk admixture purchasers.

Handling

MELCHEM is a melamine-based chemical formulation which has been found to be environmentally safe. Care should be exercised and goggles or protective eyewear are recommended. MSDS are available.

Warranty

General Resource Technology warrants **MELCHEM** to be free from defects in materials and manufacture. General Resource Technology is not responsible for conditions outside its control, Including other materials, workmanship, design, inspection, supervision, labor, ambient temperature and field conditions, which are the proper responsibility of others.

METRO MATERIALS, INC. & WESTERN READY-MIX, INC.

REQUEST FOR CONCRETE TEST REPORTS

Dear Valued Customer,

We at Metro Materials, Inc. /Western Ready-Mix, Inc. are pleased to provide you with the accompanying concrete material mix design(s) for your project. Our concrete mixtures are designed and produced with relevant ACI and ASTM requirements. We are often required to provide submittal data supporting our concrete mix designs in accordance with **ACI 301** ***Specifications for Structural Concrete***. In order for you to meet your contractual agreement in accordance with **ACI 301** and **ASTM C94** ***Standard Specification for Ready-Mixed Concrete,*** please provide or have the testing agency provide Metro/Western with a copy of all concrete test reports on your project in a timely manner by either mail to:

323 Josephville Road
Wentzville, MO 63385
Attention: Jeff Stretch

Or email at jeff.stretch@metro-materials.com. The following excerpts from **ACI 301** and **ASTM C94** referenced above:

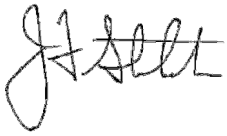
> **ACI 301 Section 1.6.4.1.c** states, "The testing agency will report test and inspection results that pertain to the work to the Architect/Engineer, Contractor, and concrete supplier within 7 days after tests and inspections are performed."
>
> **ASTM C94 Section 6.7** states, "The purchaser shall ensure that the manufacturer is provided copies of all reports of tests performed on concrete samples taken to determine compliance with specification requirements. Reports shall be provided on a timely basis."

This requirement allows us to track trends on your project, our raw materials, and address any potential problems before they become large scale. Also, these reports provide essential information required for submittals of historical data on future project submittals.

During the course of your project, should the testing agency ever determine the fresh concrete to be out of compliance or fails to meet contractual requirements, please don't hesitate to contact us immediately. Please call dispatch at (636) 887-8300 or me at (314) 283-3699.

Thank you for your help on this matter.

Respectfully,



Jeff Stretch

CANNONDESIGN

SUBMITTAL IDENTIFICATION SHEET

To be completed by Contractor/CM

WEBSTER UNIVERSITY ISB
PROJECT NAME

8274 BIG BEND BLVD
ADDRESS

NUMBER

WEBSTER UNIVERSITY
OWNER

CANNON DESIGN
ARCHITECT / ENGINEER

DEVIN D GATES
SUBMITTED BY

316329-001
CONTRACTOR / CM SUBMITTAL NO.

CANNON DESIGN SUBMITTAL NO.

DRAWING / DETAIL REFERENCE

316329
SPECIFICATION SECTION / PARAGRAPH

MANUFACTURER / SUPPLIER

ITEM / PRODUCT ID

REQUIRED DATE

PRIORITY

◯ CRITICAL

ITEM BEING SUBMITTED (check only one)

- ◯ Shop Drawings
- ◉ Samples (_____ copies)
- ◯ LEED Submittal
- ◯ Certification / Qualifications
- ◯ Record Documents
- ◯ Product Data
- ◯ Coordination Drawing
- ◯ Calculations
- ◯ Schedules
- ◯ O&M Manuals
- ◯ Other Mix design

ITEM BEING SUBMITTED FOR (check only one)

◉ Action ◯ Information Only ◯ Record

REMARKS OR DEVIATIONS

CONTRACTOR / CM CERTIFICATION
(SUBMITTALS NOT CERTIFIED WILL BE RETURNED WITHOUT REVIEW)

PARIC

PARIC CORPORATION
SUBMITTAL STAMP

THIS SHOP DRAWING HAS BEEN REVIEWED BY PARIC CORPORATION

Subcontractor remains responsible for dimensions, quantities, coordination with other trades and compliance with contract documents.

By:
Devin D. Gates

DEVIN D GATES
REVIEWED BY

DATE

To be completed by Reviewer

31 6329-001
CANNON DESIGN SUBMITTAL NUMBER

4/15/16
RECEIVED DATE

- ◉ A. No Exceptions Taken
  No further review of submittal is required.
- ◯ B. Make Corrections Noted
  Incorporate corrections in work; resubmission is not required.
- ◯ C. Revise and Resubmit
  Revise as noted, and resubmit for review.
- ◯ D. Rejected
  Submittal is not in compliance with Contract Documents; provide new submittal.
- ◯ E. For Record / Information Only
  Submittal was reviewed for Record / Information purposes only.
- ◯ F. Not Required for Review
  Submittal is not required by Contract Documents and has not been reviewed.

Review is for conformance with the design concept of this project and for general compliance with contract documents. Contractor is responsible for quantities, dimensions and compliance with contract documents and for information that pertains to fabrication processes, construction techniques and coordination of this work with all trades which will be affected thereby. This review is null and void if submittal deviates from contract documents and does not indicate or note deviations.

A/E COMMENTS ◯ See attached sheet(s) for additional comments

SHOP DRAWING / SUBMITTAL REVIEW

- ☒ NO EXCEPTION TAKEN
- ☐ EXCEPTIONS NOTED, RESUBMITTAL NOT REQUIRED
- ☐ REJECTED
- ☐ REVIEWED FOR INFORMATION ONLY
- ☐ REVISE AND RESUBMIT AS NOTED

Checking is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for: Dimensions which shall be confirmed and correlated at the job site, fabrication processes and techniques of the construction, coordination of his work with that of all other trades and the satisfactory performance of his work.

DAVID MASON & ASSOCIATES, INC.

REVIEW BY: JYW / DMA DATE: 04/19/2016

REVIEWED BY

DATE

77 Westport Plaza
Suite 250
St. Louis, MO 63146

TRANSMITTAL

No. 15051-0017

Paric Corporation

PROJECT: Webster University Interdisciplinary Science Building

DATE: 04/15/2016

TO: Cannon Design
1100 Clark Ave
St Louis MO 63102

RE: Drilled piers mix design

ATTN: Kelvin Patel

JOB: 15051

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
☐ Shop Drawings	☐ Approval	☐ Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as Noted
☐ Prints	☐ As Requested	☐ Returned After Loan
☐ Change Order	☐ Review and Comment	☐ Resubmit
☐ Plans		☐ Submit
☐ Samples	**SENT VIA:**	☐ Returned
☐ Specifications	☐ Attached	☐ Returned for Corrections
☑ Other: mix design	☐ Separate Cover Via:	☐ Due Date:

Item	*Package*	*Code*	*Rev.*	*Copies*	*Date*	*Description*	*Status*
Submittal		316329-001	1		04/15/2016	Drilled piers mix design	

NOTES:

CC:

Signed: _____
Devin Gates