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

# SUBMITTAL TRANSMITAL

July 28, 2011
**WGC Submittal No: 03300-010.E**

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: **Garney Companies Inc.**
7911 Shaffer Parkway
Littleton, CO 80127

SUBJECT: Resubmittal: Secondary Clarifier Concrete Wall Mix 5" Slump.

SPEC SECTION: 03300 – Cast-In-Place Concrete

PREVIOUS SUBMISSION DATES: 7/28/11

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: July 28, 2011<br>Reviewed by: H.C. Myers<br>( X ) Reviewed Without Comments<br>( ) Reviewed With Comments | |

ENGINEER'S COMMENTS:_____

_____

# TRANSIT MIX CONCRETE CO.

**Colorado Springs**
P.O. Box-1030, CO 80901
(719) 475-0700 (Fax) 475-0226

**Pueblo**
P.O. Box-857, CO 81002
(719) 561-8350 (Fax) 566-0231

## CONCRETE MIX DESIGN

July 28, 2011

Secondary Clarifier
Birdsall Road East of Old Pueblo Road
El Paso County, CO

**ALTERNATE MIX DESIGN**

"Structural Concrete for Liquid Containment Structures - Walls"

4500 PSI @ 28 Days (Specification) • Fly Ash • Air Entrained • 0.42 Maximum W/CM • 5000 PSI @ 28 Days (Design)

GARNEY COMPANIES Inc.
7911 Shaffer Parkway
Littleton, Colorado 80127

| | | ONE CUBIC YARD |
|---|---|---|
| Cement | ( Holcim I/II Florence,CO Terminal ) | 564 lbs |
| Fly Ash | ( SRMG Class F ) | 141 lbs |
| WRA | ( BASF 200N ) | 21.2 ozs |
| HWRA | ( BASF Polyheed 1020 ) | 49.4 ozs |
| AEA | ( BASF AE 90 ) | 4.1 ozs |
| Sand | ( 41% Daniels Sand ASTM C 33 ) | 1200 lbs |
| Rock | ( 59% TMP #57/67 ASTM C 33 ) | 1725 lbs |
| Water | | 268 lbs |

**Transit Mix Concrete CO Mix Identification Number: 65782110**

| Approximate Physical Properties: | |
|---|---|
| Unit Weight – pcf | ± 142.1 |
| Slump – Inches | 5.00" MAX |
| Air Content - % | 6.0% ± 1.0% |
| Water / Cement Ratio | 0.380 |

This mix is derived from the enclosed John B. Morgan, P.E. Trial Mix Design dated January 5, 2010. 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 and Aggregate Tests
Transit Mix Concrete Company
Mix Design Identification: 65782110
5000 PSI @ 28 Days (80-20)• 650 Modulus of Rupture • Maximum W/C = 0.40
Date Cast: Tuesday, January 05, 2010

| Mix Proportions | 1 Cubic Yard | 1 Cubic Meter |
|---|---|---|
| Cement (Holcim I/II - Florence, CO) | 564 lbs | 334.6 Kg |
| Fly Ash (SRMG Class F - Cholla) | 141 lbs | 83.7 Kg |
| WRA (MB 200 N) | 21.2 ozs | 820.0 mL |
| HRWRA (MB Polyheed 1020) | 49.4 ozs | 1910.8 mL |
| AEA ( MB AE-90) | 4.1 ozs | 158.6 mL |
| Coarse Aggregate (TMOP) | 1725 lbs | 1023.4 Kg |
| Fine Aggregate (Daniels Sand CO) | 1200 lbs | 711.9 Kg |
| Water | 268 lbs | 159.0 Kg |

| Physical Properties | | |
|---|---|---|
| Unit Weight | 142.1 pcf | 2276 Kg |
| Slump | 5.00 " | 127 mm |
| Air Content | 5.4 % | 5.4 % |
| Temperature | 77 $^0$F | 25.0 $^0$C |
| Water/Cement Ratio (by weight) | 0.380 | 0.380 |
| Relative Yield | 1.02 | 1.02 |
| Yield | 27.43 pcf | |

| Compressive Strength | (PSI) | (Mpa) |
|---|---|---|
| 3 Days | 4130 | 28.5 |
| | 4190 | 28.9 |
| Average | 4160 | 28.7 |
| 7 Days | 5180 | 35.7 |
| | 5220 | 36.0 |
| Average | 5200 | 35.9 |
| 14 Days | 6000 | 41.4 |
| | 6280 | 43.3 |
| Average | 6140 | 42.3 |
| 28 Days | 6980 | 48.1 |
| | 7140 | 49.2 |
| | 6990 | 48.2 |
| Average | 7040 | 48.5 |
| 7 Days Flexural | 770 | 5.31 |
| | 760 | 5.24 |
| Average | 765 | 5.27 |
| 28 Days Flexural | 825 | 5.7 |
| | 845 | 5.8 |
| | 840 | 5.8 |
| | 830 | 5.7 |
| Average | 835 | 5.8 |


400 South 7th Street, Raton, New Mexico 87740
Phone: (575) 445-8738 Mobile: (719) 332-4557 Fax: (575) 445-7055

# Material Certification Report

| | | | |
|---|---|---|---|
| Material: | Portland Cement | Test Period: | 01-Feb-2011 |
| Type: | I-II(MH) (ASTM C 150) | 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. | Source Location: | Portland Plant<br>3500 State Highway 120<br>Florence, Co. 81226 |
| Address: | 3500 State Highway 120<br>Florence, Co. 81226 | | |
| Telephone: | 719-784-1307 | Contact: | Dick Roush |
| Date Issued: | 11-Mar-2011 | | |

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 |
| $SiO_2$ (%) | - | 19.5 | Air Content (%) | 12 max | 6 |
| $Al_2O_3$ (%) | 6.0 max | 4.7 | Blaine Fineness ($m^2$/kg) | 260 min<br>430 max | 406 |
| $Fe_2O_3$ (%) | 6.0 max | 3.3 | | | |
| CaO (%) | - | 63.2 | | | |
| MgO (%) | 6.0 max | 1.5 | Autoclave Expansion (%) (C 151) | 0.80 max | -0.01 |
| $SO_3$ (%)[C] | 3.0 max | 3.5 | Compressive Strength MPa (psi): | | |
| Loss on Ignition (%) | 3.0 max | 2.3 | | | |
| Insoluble Residue (%) | 0.75 max | 0.32 | 3 days | 10.0 (1450) min | 31.0 (4500) |
| $CO_2$ (%) | - | 1.2 | 7 days | 17.0 (2470) min | 36.6 (5310) |
| Limestone (%) | 5.0 max | 3.3 | | | |
| $CaCO_3$ in Limestone (%) | 70 min | 83 | Initial Vicat (minutes) | 45-375 | 123 |
| Inorganic Processing Addition | 5.0 max | 0.0 | | | |
| Potential Phase Compositions[D]: | | | Mortar Bar Expansion (%) (C 1038) | | 0.010 |
| $C_3S$ (%) | - | 59 | | | |
| $C_2S$ (%) | - | 11 | | - | - |
| $C_3A$ (%) | 8 max | 7 | | | |
| $C_4AF$ (%) | - | 10 | | | |
| $C_3S + 4.75C_3A$ (%) | 100 max | 92 | | | |

## Tests Data on ASTM Optional Requirements

| Chemical | | | Physical | | |
|---|---|---|---|---|---|
| Item | Limit[A] | Result | Item | Limit[B] | Result |
| Equivalent Alkalies (%) | | 0.70 | Heat of Hydration: 7 days, kJ/kg (cal/g)[B] | | 354 (85) |

## Notes

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

[B] 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.

[C] It is permissible to exceed the specification limit provided ASTM C 1038 Mortar Bar Expansion does not exceed 0.020 %.

[D] 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.

Salt River Materials Group

PHOENIX CEMENT

Transit Mix Concrete
Attn: Robert Montoya
444 E Costilla St.
Colorado Springs, CO 80903-3761


**Corporate Headquarters**
8800 E Chaparral Rd, Ste 155
Scottsdale, AZ 85250
Phone: 480-850-5757
Fax: 480-850-5758

**Cement Manufacturing**
3000 W Cement Plant Rd
Clarkdale, AZ 86324
Phone: 928-634-2261
Fax: 928-634-3543

**19th Avenue Facility**
1802 W Lower Buckeye Rd
Phoenix, AZ 85007
Phone: 602-253-9149
Fax: 602-253-9160

**Lower Buckeye Facility**
1941 W Lower Buckeye Rd
Phoenix, AZ 85009
Phone: 602-258-7798
Fax: 602-525-3362

**21st Avenue Facility**
1325 N 21st Avenue
Phoenix, AZ 85009
Phone: 602-254-3824
Fax: 602-254-3825

**Mesa Community Storage**
Dobson & McKellips
Mesa, AZ 85211
Phone: 480-990-7847

**Cholla Fly Ash Facility**
P O Box 380
Joseph City, AZ 86032
Phone: 928-288-1661
Fax: 928-288-1663

**Four Corners Fly Ash Facility**
P O Box 1007
Fruitland, NM 87416
Phone: 505-598-8657
Fax: 505-598-8633

**San Juan Fly Ash Facility**
San Juan Generating Station
Waterflow, NM 87421
Phone: 505-598-7546
Fax: 505-598-7547

**Escalante Fly Ash Facility**
CR19 / P O Box 620
Prewitt, NM 87405
Phone: 505-285-4590
Fax: 505-285-4667

**Gallup Fly Ash Facility**
9001/4 N 9th St.
Gallup, NM 87305


Product: Class F Fly Ash, Cholla Fly Ash
ASTM C 618

# POZZOLAN TEST REPORT

**1-09-11** Ctl#: 49287

| **Lot: 2064** | **Results** | **Specifications** |
|---|---|---|
| Chemical Analysis (C311 / C114 / D4326) | | |
| Silicon Dioxide, $SiO_2$ | 58.32 % | --- |
| Aluminum Oxide, $Al_2O_3$ | 23.56 % | --- |
| Ferric Oxide, $Fe_2O_3$ | 6.48 % | --- |
| $SiO_2+Al_2O_3+Fe_2O_3$ | 88.36 % | 70.00 Min |
| Calcium Oxide, CaO | 3.26 % | --- |
| Magnesium Oxide, MgO | 1.05 % | --- |
| Sulfur Trioxide, $SO_3$ | 0.37 % | 5.00 Max |
| Moisture Content | 0.17 % | 3.00 Max |
| Loss on Ignition | 0.27 % | 6.00 Max |
| Available Alkalis as $Na_2O$ | 0.22 % | --- |
| Alkalis ($\%Na_2O + 0.658\% K_2O$) | 1.19 % | --- |
| R Factor (%CaO -5) / (%FeO) | -0.27 % | --- |
| Physical Analysis | | |
| Fineness, amount retained on #325 sieve, % (C430) | 17.30 | 34.00 Max |
| variation, points from average | 0.85 | 5.00 Max |
| Density, g/cm3 (C188) | 2.23 | --- |
| Variation from average, % | 0.03 | 5.00 Max |
| Strength Activity Index with Portland Cement (C311 / C109) | | |
| at 7 days, % of cement control | 80.16 | --- |
| at 28 days, % of cement control | 84.26 | 75.00 Min |
| Water Requirement (C311) | | |
| % of cement control | 96.69 | 105.00 Max |
| Soundness, autoclave expansion (C311 / C151) | | |
| or contraction, % | -0.06 | 0.80 Max |

All tests have been made in strict accordance with the current standards of the American Society for Testing and Materials covering the type of material specified.

Lee Gorby, Quality Assurance Manager
24 FEB 2011

BASF

The Chemical Company

May 12, 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 III

Richard Hubbard
Sr. Technical Marketing Specialist, BASF Corporation

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

Master Builders
**Admixture Solutions**

BASF

The Chemical Company

May 12, 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 65 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 III

Richard Hubbard
Sr. Technical Marketing Specialist, BASF Corporation

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

Master Builders
**Admixture Solutions**

BASF

The Chemical Company

July 20, 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 Boulvard
Cleveland, OH 44122
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www.masterbuilders.com

Master Builders
Admixture Solutions

# Transit Mix Concrete Co. Materials Laboratory

444 East Costilla 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) 583-0345

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 |

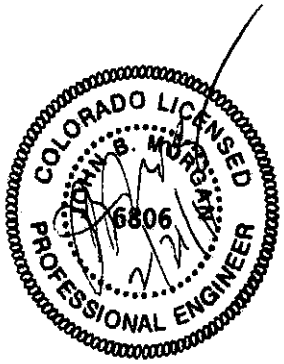
| | | |
|---|---|---|
| Fineness Modulus: 2.60 | | AASHTO T-37 |
| Bulk Specific Gravity (SSD): 2.59 Absorption: 1.0% | | AASHTO T-85 |
| Magnesium Sulfate Soundness (Five Cycles): 2.1% Loss | | AASHTO T-104 |
| Sodium Sulfate Soundness (Five Cycles): 1.0% Loss | | AASHTO T-104 |
| Average Sand Equivalent: 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 Costilla 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) 583-0345

## 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**

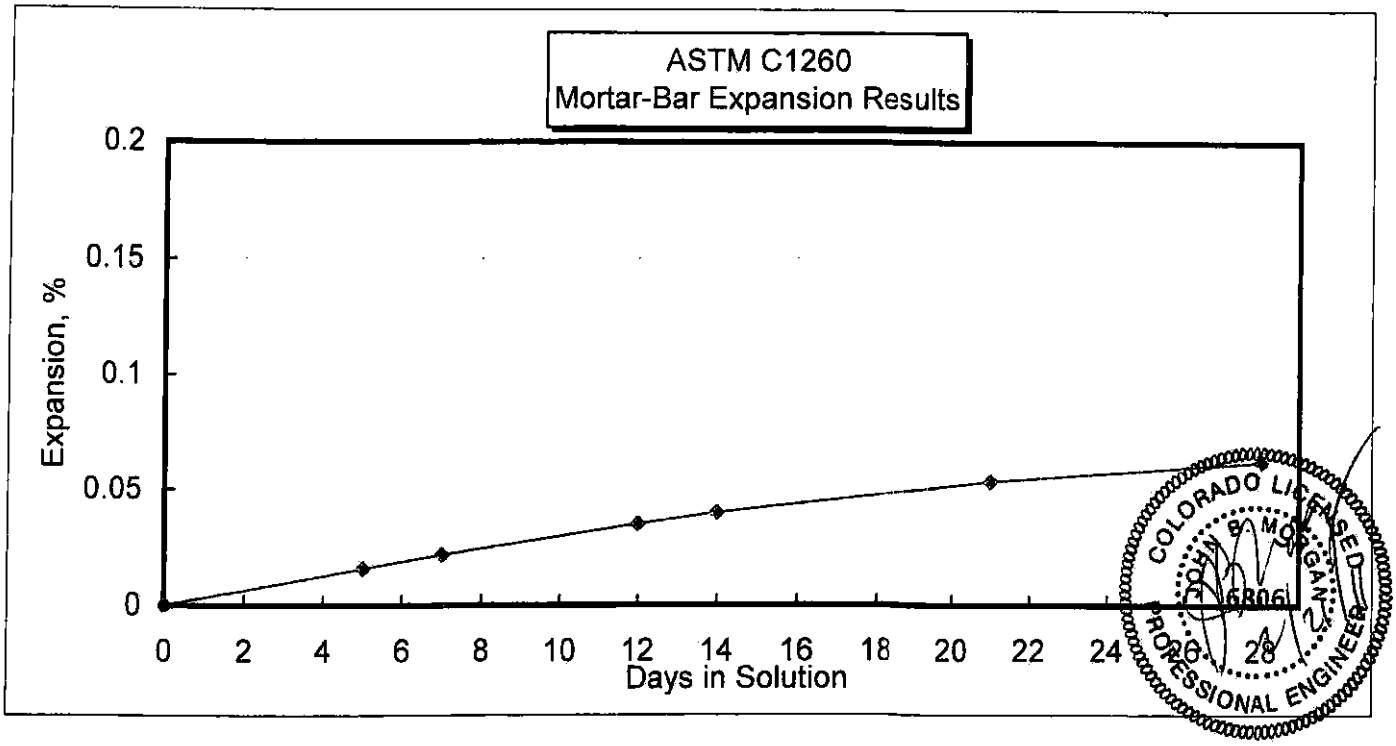
| Materials | Source | Product | Blend | Batch Weights, g | | Notes |
|---|---|---|---|---|---|---|
| Cement | Holcim Florence, CO | Type I/II | 100% | 440 | 440 | Batched: 1/17/2011 |
| Flyash | | | | | | |
| Coarse | | | | | 990 | |
| Sand | Daniels Colo Spgs, CO | FCA | 100% | 990 | | |
| Water |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

**Specimen ID: D-1, 2, 3**

| Days | Date | Comparator Readings | | | Mortar Bar Expansion, % | | | Average |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1 | 2 | 3 | |
| 0 | 1/19/2011 | 0.1700 | 0.1700 | 0.1710 | | | | 0.0000 |
| 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*







Revised: 11/1/2009

# Transit Mix Concrete Co. Materials Laboratory

444 East Costilla 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) 583-0345

February 15, 2011

RE: No. 57/67 Coarse Concrete Aggregate
Transit Mix of Pueblo
Pueblo, CO 81002

Gentlemen:

This letter presents the results of physical properties and deleterious substances tests performed on a coarse aggregate that was sampled on January 5, 2011 at Transit Mix of Pueblo Aggregate Pit. 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" | 91 | ---- | 90 - 100 |
| 12.5 mm, 1/2" | 53 | 25 - 60 | ---- |
| 9.5 mm, 3/8" | 30 | ---- | 20 - 55 |
| 4.75 mm, No. 4 | 3.1 | 0 - 10 | 0 - 10 |
| 2.36 mm, No. 8 | 2.0 | 0 - 5 | 0 - 5 |
| 75 um, No. 200 | 0.9 | 0 - 1.5 | 0 - 1.5 |

| | |
|---|---|
| Los Angeles Abrasion (Grading B): 30.0% Loss | AASHTO T-96 |
| Bulk Specific Gravity (SSD): 2.62 Absorption: 1.1% | AASHTO T-85 |
| Magnesium Sulfate Soundness (Five Cycles): 3.0% Loss | AASHTO T-104 |
| Sodium Sulfate Soundness (Five Cycles): 1.0% Loss | AASHTO T-104 |
| Clay Lumps and Friable Particles: 0 | AASHTO T-112 |
| Fractured Particles (2 Fractured Faces): 72% | ASTM D 5821 |
| Organic Impurities: Clear | AASHTO T-21 |
| Bulk Density by Rodding: 99 lb/ft$^3$ Voids: 39% | AASHTO T-19 |
| Mortar Bar Expansion, (ASR) - Sodium Hydroxide: 0.09% | ASTM C 1260 |

The above sample was tested according to American Society for Testing and Materials (ASTM) procedures D-75, C-702, C-117, C-136, C-33, C-40, C-142, C-88, C-127, C-131, C-29 and C-1260.

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

# Transit Mix Concrete Co. Materials Laboratory

444 East Costilla 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) 583-0345

## Modified ASTM C 1260 / C 1567 Tests No. 100801T

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

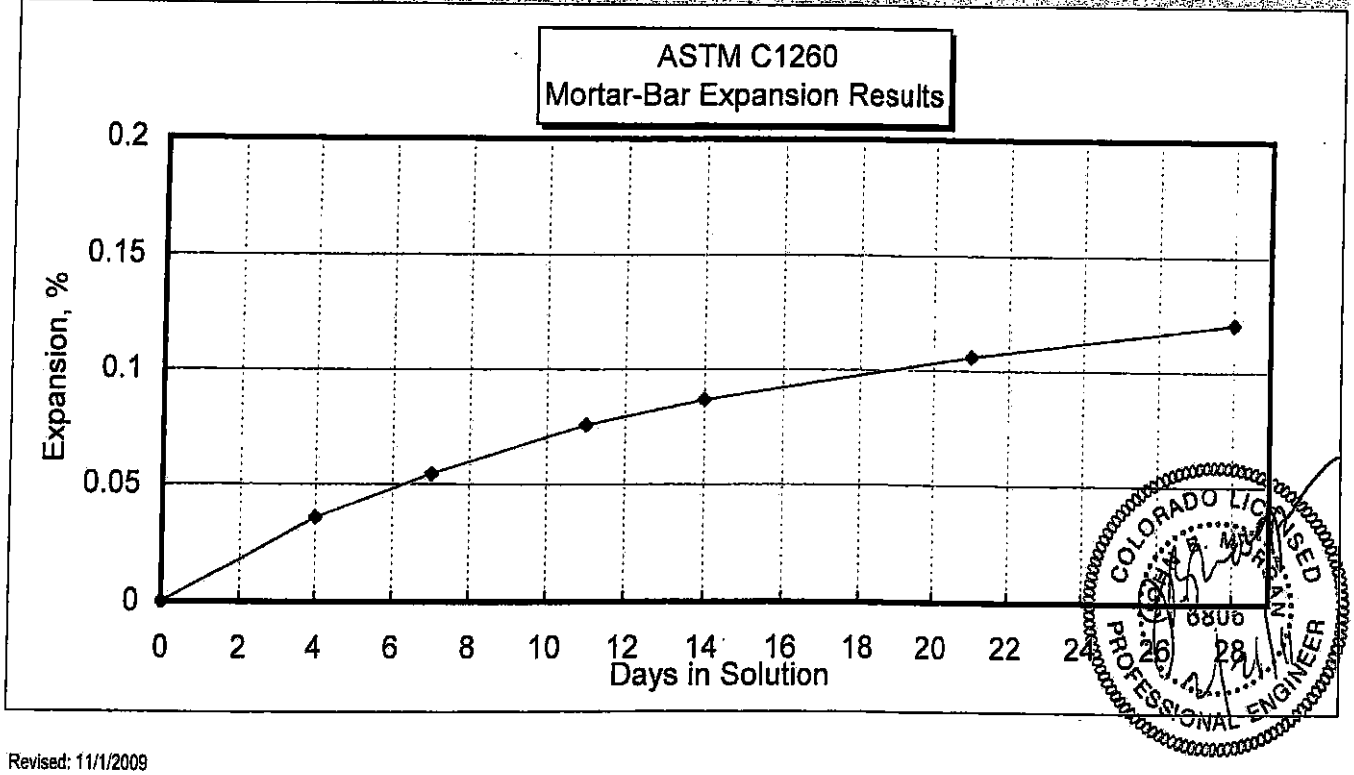
| Materials | Source | | Product | Blend | Batch Weights, g | | Notes |
|---|---|---|---|---|---|---|---|
| Cement | Holcim | Florence, CO | Type I/II | 100% | 440 | 440 | Batched: 1/11/2011 |
| Flyash | | | | | | | |
| Coarse | TMOP | Pueblo, CO | 57/67 | 100% | 990 | 990 | |
| Sand | | | | | | | |
| Water | | | | | 206.8 | | |
| W/C Ratio | | | | | 0.47 | | Completed: 2/10/2011 |

**Specimen ID: 801T-1, 2, 3**

| Days | Date | Comparator Readings | | | Mortar Bar Expansion, % | | | Average |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1 | 2 | 3 | |
| 0 | 1/13/2011 | 0.1775 | 0.1777 | 0.1695 | | | | 0.0000 |
| 4 | 1/17/2011 | 0.1810 | 0.1814 | 0.1731 | 0.0350 | 0.0370 | 0.0360 | 0.0360 |
| 7 | 1/20/2011 | 0.1828 | 0.1833 | 0.1750 | 0.0530 | 0.0560 | 0.0550 | 0.0547 |
| 11 | 1/24/2011 | 0.1850 | 0.1855 | 0.1770 | 0.0750 | 0.0780 | 0.0750 | 0.0760 |
| **14** | **1/27/2011** | **0.1861** | **0.1865** | **0.1782** | **0.0860** | **0.0880** | **0.0870** | **0.0870** |
| *21* | *2/3/2011* | *0.1878* | *0.1889* | *0.1799* | *0.1030* | *0.1120* | *0.1040* | *0.1063* |
| *28* | *2/10/2011* | *0.1895* | *0.1903* | *0.1812* | *0.1200* | *0.1260* | *0.1170* | *0.1210* |

**Average Percent Expansion at 14 days in solution (16 days of age) 0.09**

*28 Day expansion results are for informational purposes only* *0.12*







Revised: 11/1/2009

North American Testing, Inc

5910 Buttermere Dive
Colorado Springs, CO 80906

# COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS

Client: MA Mortenson

Project No: 09-33
Lab No: C2HS #1
Reviewed by:
Date of Report: 5/06/10

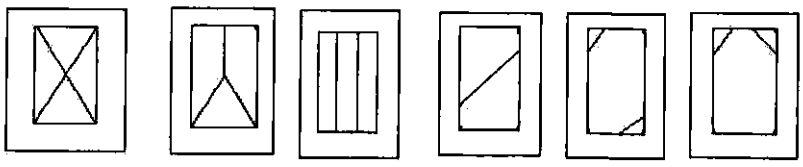
| | | | | | |
|---|---|---|---|---|---|
| Project: | Wilderness IBCT COFS | | Location: | FTC | |
| Contractor: | MAM | | Arch / Eng: | | |
| Sample Location: | COF-2 hardstand @ gridlines 13.6 - E.3 | | | | |
| Source of Sample: | *truck chute, midload, pump hose, other*: | | | | |
| Concrete Supplier: | Transit Mix | | Water added on job, gal: | 0 | |
| Ticket No: | 136079 | | Mea Slump, in: (C143) | 4 1/4 | |
| Batch Size, cy: | 9.0 | | Mea Air content, %: (C231) | 5.0 | |
| Mix Ident: | 65782110 | | Conc Temp, Deg F: (C1064) | 67 | |
| Des Strength, PSI | 5500 | 28 Days | Ambient Temp, Deg F: | 53 | |
| Required Str, PSI | 5000 | 28 Days | Plastic Unit, PCF: | 143.1 | |
| Max Size Agg, in: | 3/4" | | No of Cylinders Cast: (C31) | 4 | |
| Batch Time: | 6:20 | | Sampled by: | MAC | Date: 5/06/10 |
| Discharge Time: | DNO | | Authorized by: | | Date: 5/06/10 |
| Truck No.: | 28 | | Test Procedure: ASTM C39 | | |

Remarks:

Note: Cylinders are 4" x 8" , area = 12.57 sq in, unless otherwise indicated.

| Specimen Marking | Date Tested | Specimen Age in Day | Compressive Strength | | | | Type of Fracture | Defects in Spec/Cap | Tested by |
|---|---|---|---|---|---|---|---|---|---|
| | | | Pound Force | Diameter | Area | Psi | | | |
| C2HS #1 | 5/13/10 | 7 | 68630 | 4.001 | 12.57 | 5458 | 2 | - | TB/JA |
| C2HS #1 | 6/3/10 | 28 | 94170 | 3.998 | 12.55 | 7501 | 2 | - | EC/JA |
| C2HS #1 | 6/3/10 | 28 | 97110 | 3.998 | 12.55 | 7735 | 2 | - | EC/JA |
| | | | | 28 Day Average | | 7618 | | | |
| | | | | | | | | | |
| | | | | | | | | | |

| Cone | Cone & Split | Columnar | Shear | Side Frac (Top or Bot) | Top Pointed |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |



North American Testing, Inc

5910 Buttermere Dive
Colorado Springs, CO 80906

# COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS

Client: MA Mortenson

Project No: 09-33
Lab No: C3HS #1
Reviewed by:
Date of Report: 5/18/10

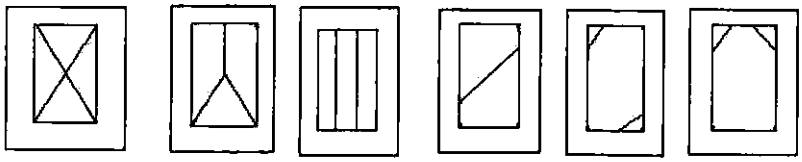
| | | | | | |
|---|---|---|---|---|---|
| Project: | Wilderness IBCT COFS | | Location: | FTC | |
| Contractor: | MAM | | Arch / Eng: | | |
| Sample Location: | COF-3 hardstand @ gridlines 14.8 - E.2, | | | | |
| Source of Sample: | *truck chute, midload, pump hose, other*: | | | | |
| Concrete Supplier: | Transit Mix | | Water added on job, gal: | 0 | |
| Ticket No: | 136758 | | Mea Slump, in: (C143) | 4 1/4 | |
| Batch Size, cy: | 10.0 | | Mea Air content, %: (C231) | 6.4 | |
| Mix Ident: | 65782110 | | Conc Temp, Deg F: (C1064) | 69 | |
| Des Strength, PSI | 5500 | 28 Days | Ambient Temp, Deg F: | 52 | |
| Required Str, PSI | 5000 | 28 Days | Plastic Unit, PCF: | 140.6 | |
| Max Size Agg, in: | 3/4" | | No of Cylinders Cast: (C31) | 5 | |
| Batch Time: | 6:27 | | Sampled by: | MAC | Date: 5/18/10 |
| Discharge Time: | DNO | | Authorized by: | | Date: 5/18/10 |
| Truck No.: | 94 | | Test Procedure: ASTM C39 | | |

Remarks:

Note: Cylinders are 4" x 8" , area = 12.57 sq in, unless otherwise indicated.

| Specimen Marking | Date Tested | Specimen Age in Day | Compressive Strength | | | | Type of Fracture | Defects in Spec/Cap | Tested by |
|---|---|---|---|---|---|---|---|---|---|
| | | | Pound Force | Diameter | Area | Psi | | | |
| C3HS #1 | 5/21/10 | 3 | 61240 | 3.996 | 12.54 | 4883 | 2 | - | DC/JA |
| C3HS #1 | 5/25/10 | 7 | 63020 | 3.996 | 12.54 | 5025 | 2 | - | LS/JA |
| C3HS #1 | 6/15/10 | 28 | 81280 | 3.999 | 12.56 | 6471 | 2 | - | LS/JA |
| C3HS #1 | 6/15/10 | 28 | 82990 | 4.002 | 12.58 | 6597 | 2 | - | LS/JA |
| | | | | 28 Day Average | | 6534 | | | |
| | | | | | | | | | |

| Cone 1 | Cone & Split 2 | Columnar 3 | Shear 4 | Side Frac (Top or Bot) 5 | Top Pointed 6 |
|---|---|---|---|---|---|



North American Testing, Inc.

5910 Buttermere Dive
Colorado Springs, CO 80906

# COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS

Client: MA Mortenson

Project No: 09-33
Lab No: C3HS #2
Reviewed by:
Date of Report: 5/19/10

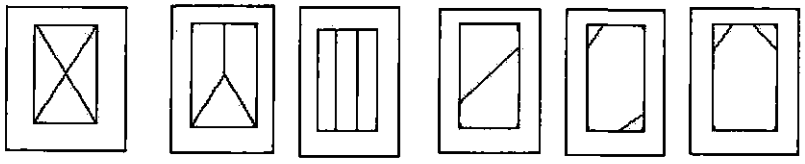
| | | | | | |
|---|---|---|---|---|---|
| Project: | Wilderness IBCT COFS | | Location: | FTC | |
| Contractor: | MAM | | Arch / Eng: | | |
| Sample Location: | COF-3 hardstand @ gridlines 6.6 - E.2 | | | | |
| Source of Sample: | *truck chute, midload, pump hose, other* : | | | | |
| Concrete Supplier: | Transit Mix | | Water added on job, gal: | 0 | |
| Ticket No: | 136785 | | Mea Slump, in: (C143) | 4 3/4 | |
| Batch Size, cy: | 10.0 | | Mea Air content, %: (C231) | 5.1 | |
| Mix Ident: | 65782110 | | Conc Temp, Deg F: (C1064) | 70 | |
| Des Strength, PSI | 5500 | 28 Days | Ambient Temp, Deg F: | 52 | |
| Required Str, PSI | 5000 | 28 Days | Plastic Unit, PCF: | 142.0 | |
| Max Size Agg, in: | 3/4" | | No of Cylinders Cast: (C31) | 5 | |
| Batch Time: | 6:02 | | Sampled by: | MAC | Date: 5/19/10 |
| Discharge Time: | DNO | | Authorized by: | | Date: 5/19/10 |
| Truck No.: | 55 | | Test Procedure: ASTM C39 | | |

Remarks:

Note: Cylinders are 4" x 8" , area = 12.57 sq in, unless otherwise indicated.

| Specimen Marking | Date Tested | Specimen Age in Day | Compressive Strength | | | | Type of Fracture | Defects in Spec/Cap | Tested by |
|---|---|---|---|---|---|---|---|---|---|
| | | | Pound Force | Diameter | Area | Psi | | | |
| C3HS #2 | 5/22/10 | 3 | 61960 | 3.996 | 12.54 | 4940 | 2 | - | TB/JA |
| C3HS #2 | 5/26/10 | 7 | 68230 | 3.996 | 12.54 | 5440 | 2 | - | LS/JA |
| C3HS #2 | 6/16/10 | 28 | 91530 | 4.001 | 12.57 | 7280 | 2 | - | LS/JA |
| C3HS #2 | 6/16/10 | 28 | 89250 | 4.000 | 12.57 | 7102 | 2 | - | LS/JA |
| | | | | 28 Day Average | | 7191 | | | |
| | | | | | | | | | |

| Cone | Cone & Split | Columnar | Shear | Side Frac (Top or Bot) | Top Pointed |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |



North American Testing, Inc.

5910 Buttermere Dive
Colorado Springs, CO 80906

# COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS

Client: MA Mortenson

Project No: 09-33
Lab No: C4HS #1
Reviewed by:
Date of Report: 6/07/10

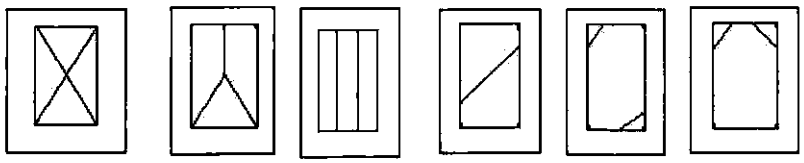
| | | | | | |
|---|---|---|---|---|---|
| Project: | Wilderness IBCT COFS | | Location: | FTC | |
| Contractor: | MAM | | Arch / Eng: | | |
| Sample Location: | COF-4 hardstand @ gridlines 16.3 E.3 | | | | |
| Source of Sample: | *truck chute, midload, pump hose, other*: | | | | |
| Concrete Supplier: | Transit Mix | | Water added on job, gal: | 0 | |
| Ticket No: | 137697 | | Mea Slump, in: (C143) | 3 | |
| Batch Size, cy: | 10.0 | | Mea Air content, %: (C231) | 5.0 | |
| Mix Ident: | 65782110 | | Conc Temp, Deg F: (C1064) | 80 | |
| Des Strength, PSI | 5500 | 28 Days | Ambient Temp, Deg F: | 70 | |
| Required Str, PSI | 5000 | 28 Days | Plastic Unit, PCF: | 142.5 | |
| Max Size Agg, in: | 3/4" | | No of Cylinders Cast: (C31) | 4 | |
| Batch Time: | 5:20 | | Sampled by: | MAC | Date: 6/07/10 |
| Discharge Time: | DNO | | Authorized by: | | Date: 6/07/10 |
| Truck No.: | 7 | | Test Procedure: ASTM C39 | | |

Remarks:

Note: Cylinders are 4" x 8" , area = 12.57 sq in, unless otherwise indicated.

| Specimen Marking | Date Tested | Specimen Age in Day | Compressive Strength | | | | Type of Fracture | Defects in Spec/Cap | Tested by |
|---|---|---|---|---|---|---|---|---|---|
| | | | Pound Force | Diameter | Area | Psi | | | |
| C4HS #1 | 6/14/10 | 7 | 65260 | 4.003 | 12.59 | 5185 | 5 | - | LS/JA |
| C4HS #1 | 7/5/10 | 28 | 88060 | 3.999 | 12.56 | 7011 | 2 | - | LS/JA |
| C4HS #1 | 7/5/10 | 28 | 85700 | 3.998 | 12.55 | 6826 | 2 | - | LS/JA |
| | | | | 28 Day Average | | 6919 | | | |
| | | | | | | | | | |
| | | | | | | | | | |

| Cone | Cone & Split | Columnar | Shear | Side Frac (Top or Bot) | Top Pointed |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |



**Kumar & Associates, Inc.**
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Winter Park/Fraser, and Frisco Colorado

# CONCRETE TEST RESULTS

**(ASTM C39)**

Phyllis Carias
US Army Corps of Engineers
PO Box 13049
Fort Carson, CO 80913

**PROJECT NO.** 09-2-112H
Wilderness Road, COF's
W912HN-08-D-0021 DK01
Cambrey Torres/Dave Micklewright,

**Sample Location** Hardstand Under Canopy at COF's #4 – 160' North, 10' East of Southwest Corner of Hardstands

**Date Sampled** 6/7/2010 | **Time Sampled** 9:40 AM | **Sampled By** Jason Eiffler
**No. of Specimens** 4 | **Curing Method** Cure Box
**Supplier** TMC | **Batch Size** 10 CY
**Truck Number** 55 | **Ticket Number** 34165 | **Batch Time** 8:55 AM
**Mix Design** 65782110 | **Date Received in Lab** 6/8/2010
**Slump** 4 in. | **Air Content** 4.7 % | **Unit Weight** 140.9 pcf
**Air Temperature** 84 | **Concrete Temperature** 81
**Water Added** 6 gals

## STRENGTH TEST DATA

**Average Specimen Diameter** 4 in. **Area** 12.57 sq. in. **Design Strength** 5000 psi

| Specimen | Test Date | Age (days) | Load (lbs) | Strength (psi) | Percent of Design | Type of Fracture |
|---|---|---|---|---|---|---|
| C1946-1 | 6/14/2010 | 7 | 56435 | 4490 | 90 | 5 |
| C1946-2 | 7/6/2010 | 29 | 76581 | 6090 | 122 | 2 |
| C1946-3 | 7/6/2010 | 29 | 79832 | 6350 | 127 | 2 |

Average 28-Day Strength: 6220 psi

**Comments:** None

**Reported By**

Brandon K. Barker, Project Supervisor

cc: book, file, TMC

North American Testing, Inc.

5910 Buttermere Dive
Colorado Springs, CO 80906

# COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS

Client: MA Mortenson

Project No: 09-33
Lab No: C6 HS 1
Reviewed by:
Date of Report: 7/08/10

| | | | | | |
|---|---|---|---|---|---|
| Project: | Wilderness IBCT COFS | | Location: | FTC | |
| Contractor: | | | Arch / Eng: | | |
| Sample Location: | COF-6 HS @ gridlines E.3-19.4 | | | | |
| Source of Sample: | *truck chute, midload, pump hose, other*: | | | | |
| Concrete Supplier: | Transit Mix | | Water added on job, gal: | 0 | |
| Ticket No: | 139402 | | Mea Slump, in: (C143) | 4 1/4 | |
| Batch Size, cy: | 10.0 | | Mea Air content, %: (C231) | 6.3 | |
| Mix Ident: | 65782110 | | Conc Temp, Deg F: (C1064) | 77 | |
| Des Strength, PSI | 5000 | 28 Days | Ambient Temp, Deg F: | 54 | |
| Required Str, PSI | 5000 | 28 Days | Plastic Unit, PCF: | 140.0 | |
| Max Size Agg, in: | 3/4" | | No of Cylinders Cast: (C31) | 4 | |
| Batch Time: | 4:20 | | Sampled by: DC | Date: | 7/08/10 |
| Discharge Time: | DNO | | Authorized by: | Date: | 7/08/10 |
| Truck No.: | 7 | | Test Procedure: ASTM C39 | | |

Remarks:

Note: Cylinders are 4" x 8" , area = 12.57 sq in, unless otherwise indicated.

| Specimen Marking | Date Tested | Specimen Age in Day | Compressive Strength | | | | Type of Fracture | Defects in Spec/Cap | Tested by |
|---|---|---|---|---|---|---|---|---|---|
| | | | Pound Force | Diameter | Area | Psi | | | |
| C6 HS 1 | 7/15/10 | 7 | 52830 | 4.000 | 12.57 | 4204 | 2 | - | LS/JA |
| C6 HS 1 | 8/5/10 | 28 | 72030 | 3.997 | 12.55 | 5740 | 2 | - | LS/JA |
| C6 HS 1 | 8/5/10 | 28 | 71500 | 4.002 | 12.58 | 5684 | 2 | - | LS/JA |
| | | | | 28 Day Average | | 5712 | | | |
| | | | | | | | | | |
| | | | | | | | | | |

| Cone | Cone & Split | Columnar | Shear | Side Frac (Top or Bot) | Top Pointed |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |