



Submittal Review Response

Project Name: Hilo WWTP Rehabilitation and Replacement Project Phase 1
Submittal No.: 02312-001.0
Date: 8/18/2025

Client: County of Hawai'i Carollo Project No.: 203975
Contractor: Nan, Inc.
Submittal Name: Controlled low strength material
Reviewed By: Jim Ewing

SUBMITTAL REVIEW

Review is for general compliance with contract documents. No responsibility is assumed by Carollo for correctness of quantities, dimensions, and details. No deviation or variation is approved unless specifically addressed in these review comments. Refer to Section 01330 for additional requirements. The Contractor shall assume full responsibility for coordination with all other trades and deviations from contract requirements.

| | | |
|----------------------|-------------------------------------|---------------------------------------|
| Approved | <input type="checkbox"/> | No Exceptions |
| | <input type="checkbox"/> | Make Corrections Noted - See Comments |
| | <input type="checkbox"/> | Make Corrections Noted - Confirm |
| Not Approved | <input checked="" type="checkbox"/> | Correct and Resubmit |
| | <input type="checkbox"/> | Rejected - See Remarks |
| Receipt Acknowledged | <input type="checkbox"/> | Filed for Record |
| | <input type="checkbox"/> | With Comments - Resubmit |

Review Comments:

- The performance data submitted on Page 2 of the MasterCell 25 Technical Data Sheet does not appear to be project-specific using materials which will be used on the project. Please verify.
 - If it isn't, please submit information and test data required by Para 1.03, particularly sub-para B and the mix design and test results required by Para 2.01 A and B using project-specific materials.
- The use of Type 1L cement is accepted.

CONTRACTOR SUBMITTAL TRANSMITTAL FORM REV. A

Owner: County of Hawaii
Contractor: Nan, Inc. **Project No.:** WW-4705R
Project Name: Hilo WWTP Phase 1 **Submittal Number:**
Submittal Title: For Information Only
TO:
From: Nan Inc.

| Specification No. and Subject of Submittal / Equipment Supplier | |
|---|------------------------|
| Spec: | Paragraph: |
| Authored By: | Date Submitted: |

| Submittal Certification | |
|--|---|
| Check Either (A) or (B): <input type="checkbox"/> (A) We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings with <u>no exceptions</u> . <input type="checkbox"/> (B) We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings <u>except</u> for the deviations listed. | |
| Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements. | |
| General Contractor's Reviewer's Signature: | |
| Printed Name and Title: | |
| In the event, Contractor believes the Submittal response does or will cause a change to the requirements of the Contract, Contractor shall immediately give written notice stating that Contractor considers the response to be a Change Order. | |
| Firm: | Signature: Date Returned: |

| PM/CM Office Use |
|--|
| Date Received GC to PM/CM: Date Received PM/CM to Reviewer: Date Received Reviewer to PM/CM: Date Sent PM/CM to GC: |

Nan, Inc

 PROJECT: HILO WWTP REHABILITATION
 AND REPLACEMENT PROJECT - PHASE 1

JOB NO. WW-4705R

 THIS SUBMITTAL HAS BEEN CHECKED BY
 THIS CONTRACTOR. IT IS CERTIFIED
 CORRECT, COMPLETE, AND IN
 COMPLIANCE WITH CONTRACT
 DRAWINGS AND SPECIFICATIONS. ALL
 AFFECTED CONTRACTORS AND
 SUPPLIERS ARE AWARE OF, AND WILL
 INTEGRATE THIS SUBMITTAL (UPON
 APPROVAL) INTO THEIR OWN WORK.

 DATE RECEIVED _____
 SPECIFICATION SECTION # _____
 SPECIFICATION _____
 PARAGRAPH _____
 DRAWING _____
 SUBCONTRACTOR _____
 SUPPLIER _____
 MANUFACTURER _____

CERTIFIED BY CQCM or Designee : _____

VARIANCE REQUEST FORM

Hilo Wastewater Treatment Plant Phase 1
Contract No. WW-4705R

VARIANCE

Request Form

Variance Request _____

**Clearly and Concisely describe the nature of your request by completing the following questions below. By submitting the Variance Request form, Sub-Contractor acknowledges that they understand and accept the limitation of this form and agree that the information provided does not guarantee the approval of the Variance request. The decision to grant or deny a variance is at the sole discretion of the relevant authority or entity responsible for reviewing such requests.*

Specification section 02256 – Foundation Probing and Grouting

1. What are the benefits the variance has to the Government?

n/a

2. What are the positive and negative impacts to the project and Government if the variance is accepted?

No positive or negative impacts

3. Discuss how the variance is “equal to” or “better than” the specification requirement.

Variance along with the supporting documents are attached in the submittal package

4. What is the cost of the product/material that is originally specified?

n/a

SPECIFICATION SECTION 02312

CLSM

SECTION 02312

CONTROLLED LOW STRENGTH MATERIAL (CLSM)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Controlled low strength material (CLSM), also known as "flowable fill."

1.02 REFERENCES

- A. American Concrete Institute (ACI):
1. 229R - Report on Controlled Low-Strength Materials.
 2. 301 - Specifications for Structural Concrete.
- B. ASTM International (ASTM):
1. C33 - Standard Specification for Concrete Aggregates.
 2. C94 - Standard Specification for Ready Mix Concrete.
 3. C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
 4. C150 - Standard Specification for Portland Cement.
 5. C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 6. C403 - Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance.
 7. C494 - Standard Specification for Chemical Admixtures for Concrete.
 8. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 9. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m³)).
 10. D4832 - Standard Test Method of Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
 11. D5971 - Standard Practice for Sampling Freshly Mixed Controlled Low Strength Material.
 12. D6023 - Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material.
 13. D6103 - Standard Test Method for Flow Consistency of Controlled Low Strength Material.

1.03 SUBMITTALS

- A. Product data: Submit data completely describing materials in the mix and demonstrating compliance with the requirements of this Section.
- ✓ 1. Cement: Mill tests. Indicate alkali content representative of each shipment.
 2. Fly ash: Identify source and type of fly ash.
 - ✓ 3. Water: Identify source and quality if not from a municipal treatment source.

WATER SOURCE:
MUNICIPAL TREATMENT

- ✓ 4. Admixtures: Manufacturer's product data indicating suitability for use in CLSM mixes and recommended dosage rates.
- ✓ 5. Aggregate:
 - ✓ a. Submit source, type, and sieve analyses. Include testing to demonstrate that materials in accordance with ASTM C33 requirements.
 - b. Resubmit at any time there is a significant change in grading of materials.
- ✓ B. Mix design:
 - ✓ 1. Submit full details, including mix design calculations for mix proposed for use.
 - 2. Trial batch test data:
 - a. Submit data for each test cylinder.
 - b. Submit data that identifies mix and slump for each test cylinder.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store or stockpile cement, fly ash, and aggregate in accordance with ACI 301.
- B. Store admixtures in accordance with the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Mixture of portland cement, water, pozzolan, fine aggregate and admixtures, proportioned in accordance with the recommendations of ACI 229 to produce a homogeneous mixture that is flowable, that will readily work into corners and angles; that will not segregate in the plastic state; and that is self-compacting at the time of placement without the use of mechanical vibration.
- B. Performance requirements:
 - 1. Air content, total calculated in accordance with ASTM D6023: Not less than 8.0 percent, nor greater than 12.0 percent.
 - 2. Compressive strength, measured in accordance with ASTM D4832 at 28 days: Not less than 50 pounds per square inch, nor greater than 150 pounds per square inch.
 - 3. Wet density: Not greater than 132 pounds per cubic foot.
 - 4. Slump, measured in accordance with ASTM C143 at the point of placement: Greater than 9 inches and that allows CLSM to flow freely and to be self-compacting during placement.

VENDOR PLAN TO UTILIZING PLC -
ASTM C595/C595M-21 TYPE 1L

2.02 MATERIALS

- A. Cement:
 - 1. Portland cement in accordance with ASTM C150, Type II.
 - 2. Having total alkali content not more than 0.60 percent.
- B. Fly ash: Class C or Class F fly ash in accordance with ASTM C618.

- C. Water:
 - 1. Potable water: Clean and free from oil and deleterious amounts of alkali, acid, organic matter, or other substances.
- D. Admixtures: Products of a single manufacturer, specifically manufactured or recommended by that manufacturer for use in CLSM.
 - 1. Air entraining admixture: In accordance with ASTM C260.
 - 2. Water reducing admixture: In accordance with ASTM C494, Type A.
- E. Aggregate:
 - 1. Non-expansive, non-reactive, inert natural sand in accordance with ASTM C33 for fine aggregate.

2.03 MIXES

- A. See Design and Performance Criteria for performance requirements of the plastic and hardened mix.

2.04 SOURCE QUALITY CONTROL

- A. Trial batch:
 - 1. After mix design has been accepted by Engineer, have trial batch of the accepted mix design prepared by testing laboratory acceptable to Engineer.
 - 2. Prepare trial batches using the specific cement, fly ash, admixtures, aggregates, and water proposed for the Work.
 - 3. Prepare trial batch with quantity sufficient to determine slump, workability, and consistency; and to provide test cylinders as indicated in this Section.
 - 4. Trial batch testing shall be performed by the Contractor.
- B. Trial batch testing:
 - 1. Determine slump in accordance with ASTM C143, with the following modifications:
 - a. Do not rod the concrete material.
 - b. Place material in slump cone in one semi-continuous filling operation, slightly overfill, tap lightly, strike off, and then measure and record slump.
 - 2. Prepare and test trial batch specimens in accordance with ASTM D4832, with the following modifications:
 - a. Provide cylindrical test specimens, each 6-inches in diameter by 12-inch high.
 - b. Provide a minimum of 8 cylinders for testing of each trial batch.
 - c. Fill the molds to overflowing and tap sides lightly to settle the mix.
 - d. Do not rod the mix for consolidation in the cylinder.
 - e. Strike off the excess material.
 - 3. Place test cylinders in a moist curing room. Exercise caution in moving and transporting the cylinders since they are fragile and will withstand only minimal bumping, banging, or jolting without damage.

4. Do not remove the test cylinder from mold until that cylinder is to be capped and tested.
 - a. Perform the capping carefully to prevent premature fractures.
 - b. Do not perform initial compression test until the cylinders reach a minimum age of 3 days.
 5. Provide compressive strength tests:
 - a. Test 4 test cylinders at 7 days after casting, and another 4 cylinders at 28 days after casting.
 - b. The compression strength of the 4 test cylinders tested at 28 days shall be equal to or greater than the minimum required compression strength, but shall not exceed maximum compression strength.
- C. If the trial batch tests do not meet the Specifications for strength or density, revise and re-submit the mix design, prepare additional trial batch(es), and complete additional trial batch tests. Repeat until an acceptable trial batch that conforms to the Specifications is produced.
1. All the trial batches and acceptability of materials shall be paid by the Contractor.
 2. After acceptance, do not change the mix design without submitting a new mix design, trial batches, and test information.

PART 3 EXECUTION

3.01 PREPARATION

- A. Do not place CLSM until preparation and condition of surfaces receiving the fill have been observed and accepted by the Engineer.
- B. Remove debris foreign matter, and standing or running water from excavations and areas receiving CLSM before placement.

3.02 INSTALLATION

- A. Pipes and trenches.
 1. Install CLSM as indicated on the Drawings and specified.
 2. Where CLSM is placed around and over pipes, secure pipes in place, or place CLSM in lifts to prevent pipe flotation.
 3. Where CLSM is placed in long, open trenches, confine material using bulkheads of sandbags, earth dams, or stiffer concrete at open ends of placement.
- B. Soil preparation:
 1. Prior to placement of CLSM, prepare underlying soils as follows:
 - a. Scarify surface to a depth of 8 inches.
 - b. Adjust moisture content to or slightly above the optimum in accordance with ASTM D1557.
 - c. Re-compact scarified surface to a minimum of 95 percent relative density in accordance with ASTM D1557.

3.03 MEASURING, BATCHING, MIXING AND TRANSPORTING

- A. Measure, batch, mix and transport CLSM in accordance with the requirements of ASTM C94 and this Section.
- B. Mix until there is uniform distribution of materials.
- C. Discharge mixer completely prior to recharging.
- D. After trial batch testing and mix acceptance, maintain slump during construction within plus or minus 1 inch of the design slump.

3.04 PLACING

- A. Place controlled low strength material by method that preserves the quality of the material in terms of compressive strength and density.
- B. Maintain fluid properties of the mix during placement.
 - 1. At point of placement, provide material that flows easily around, beneath, or through walls, pipes, conduits, or other structures.
 - 2. Do not place CLSM that has partially hardened or that has been contaminated by foreign materials.
 - 3. Handle and place CLSM using methods that minimize segregation of the mix.
 - 4. Deposit mix as near its final position as possible to avoid segregation due to rehandling or flowing.
 - 5. Contain and confine mix while it is fluid. Design containment structures and bracing at walls and forms to withstand lateral pressures of wet mix.
- C. Lifts:
 - 1. Limit lift heights of CLSM placed against structures and other facilities that could be damaged due to the pressure from the CLSM, to the lesser of 3 feet or the lift height indicated on the Drawings.
 - 2. Do not place another lift of CLSM until the last lift of CLSM has set and gained sufficient strength to prevent additional lateral load against the forms or structure due to the weight of the next lift of CLSM.
- D. Water conditions:
 - 1. Do not place CLSM in standing or flowing water.
 - 2. Do not permit water to flow over the surface of freshly placed or un-hardened CLSM.
 - 3. Do not submerge CLSM in water within 24 hours after placement.
- E. Manage CLSM bleed water.
 - 1. Grade top surface of CLSM to drain away from the fill.
 - 2. Provide side containment that permits bleed water to drain to a contained management area away from the fill.

3.05 CURING AND PROTECTION

- A. Curing:
 - 1. Prior to and during curing, install barriers to prevent equipment or personnel from falling into or becoming entrapped in CLSM.
- B. Protect CLSM from:
 - 1. Damage from the elements.
 - 2. Damage of any nature during surrounding construction operations.

3.06 FIELD QUALITY CONTROL

- A. Provide quality control over the Work of this Section as specified in Section 01450 - Quality Control and Section 01460 - Contractor Quality Control Plan and as specified in this Section.
- B. General:
 - 1. Engineer inspection and acceptance required prior to placement.
 - 2. Make provisions for and furnish all material for the test specimens, and prepare said specimens.

3.07 FIELD QUALITY ASSURANCE

- A. Field inspections:
 - 1. Engineer shall provide on-site inspection for the Work of this Section.
 - 2. Advise Engineer of readiness to proceed at least 24 hours prior to each placement of CLSM.
 - 3. Required inspections:
 - a. Engineer will observe the prepared areas. Do not place CLSM until Engineer has observed and accepted preparations.
 - 4. Record of inspections.
- B. Special tests and inspections:
 - 1. As specified in Section 01455 - Regulatory Quality Assurance.
- C. Field sampling and testing:
 - 1. During construction, Contractor shall provide sampling and testing to determine whether the CLSM, as produced and placed, complies with the requirements specified.
 - 2. Sample CLSM for testing in accordance with ASTM D5971.
 - 3. Required tests:
 - a. Air content: Prepare sample and test in accordance with ASTM D6023.
 - b. Compressive strength: Prepare and test cylinder specimens in accordance with ASTM D4832.
 - 1) Prepare 6-inch diameter by 12-inch high specimens for testing.
 - a) Provide one set of specimens for each 150 cubic yards of CLSM placed, but not less than 1 set for each half day's placement.
 - b) Prepare and test not less than 3 cylinders for each set.

- c) Place CLSM in the molds in accordance with ASTM D4832. Do not rod or otherwise consolidate the material in the mold.
 - d) In accordance with ASTM D4832 recommendations for displacing bleed water at the top of the molds and refilling the molds before covering with a lid. Do not use air-tight lids.
- 2) Place the cylinders in a safe location away from construction activities.
 - a) Protect cylinders from bumping and impact.
 - b) Maintain temperature surrounding cylinders between 60 and 80 degrees Fahrenheit until delivery to the laboratory for testing.
 - c) After the first day, surround molds with a high humidity environment by covering with wet burlap, or equivalent highly absorptive material. Maintain saturation of the cover. Do not sprinkle water directly on the cylinders.
- 3) After 4 days, place the cylinders in a protective container for transport to the laboratory for testing.
 - a) Exercise caution in moving and transporting the cylinders since they are fragile and will withstand only minimal bumping, banging, or jolting without damage.
 - b) Transport container may be a box with a Styrofoam or similar lining that will limit jarring and bumping of the cylinders.
- 4) Upon receipt at the testing laboratory, place test cylinders in a moist curing room until dates for testing.
- 5) Do not remove test cylinders from molds until the day that cylinders is to be capped and tested.
- 6) Cap and test for compressive strength in accordance with ASTM D4832.
 - a) Do not perform initial compression test until the cylinders reach an age of at least 4 days.
 - b) Test 1 cylinder at 7 days and 2 cylinders at 28 days.
- 7) Compressive strength of the cylinders tested at 28 days shall be equal to or greater than the minimum required compression strength, but shall not exceed maximum compression strength specified.

3.08 NON-CONFORMING WORK

- A. When testing or observation indicates CLSM with properties outside the specified and accepted range, Engineer will issue instructions regarding disposition of nonconforming materials.
- B. Engineer may:
 - 1. Reject CLSM represented by those test specimens and require its removal and replacement.
 - 2. Require modification of the mix design to provide CLSM with the properties specified.
- C. Make such modifications at no additional expense to the Owner and with no adjustment to the schedule.

END OF SECTION

DESIGN MIX - ADMIXTURES - AGGREGATE



CON-AGG of HAWAII

A Division of Yamada and Sons, Inc.

733 KANOELEHUA AVENUE • P.O. BOX 4699 • HILO, HAWAII 96720
PHONE NO. (808) 933-8492 • FAX NO. (808) 933-8496

DATE: May 28, 2025

TO: Nan, Inc.

FROM: Yamada and Sons, Inc. • Concrete & Quality Control Divisions

PROJECT: Hilo WWTP Rehabilitation and Replacement Project Phase 1

PROJECT NO.: WW-4705R

SUBJECT: CLSM 50-150PSI

Royden J. Crivello

PREPARED BY: Royden J. Crivello

Division Manager

Con-Agg of Hawaii • Yamada and Sons, Inc.



YAMADA AND SONS, INC.

MIX DESIGN FOR PORTLAND CEMENT CONCRETE
(Approval of mix design required prior to usage in concrete work)

TO: Nan, Inc. DATE: May 28, 2025

FROM: Yamada and Sons, Inc. PLANT: Yamada and Sons, Inc.

PROJECT: Hilo WWTP Rehabilitation and Replacement Project Phase 1

PROJECT NO.: WW-4705R

CLASS: CLSM 50-150PSI • Air Entrained MIX #: 50008F-AE

DESIGN WEIGHTS PER CUBIC YARD

| Material | Cement | | Crushed Fine | | | Water | Total |
|----------------------------------|----------|--|--------------|--|--|-------|-------|
| Source | Hawn Cmt | | Yamada | | | Hilo | |
| SSD Weight Lbs. | 71 | | 3068 | | | 425 | 3564 |
| Specific Gravity | 3.15 | | 2.87 | | | 1 | |
| Absolute Volume, ft ³ | 0.36 | | 17.13 | | | 6.81 | 24.3 |
| Moisture % | | | | | | | |
| Absorption % | | | 2.1 | | | | |
| Correction % | | | | | | | |
| Correction Lbs. | | | | | | | |
| Batch Wt. Lbs. | | | | | | | |

ADMIXTURE(S) AND DOSAGE:

MasterCell 25 (small bag) 0.50 bag/cy

MasterPozzoloth 322 6.00 oz/cwt

ADMIXTURE(S) AND DOSAGE:

DESIGN DATA:

Slump: 9"- 11" Air %: 10% Unit Weight (lb/ft³): 132.00

W/C Ratio: 5.99 Gallons of water per bag (94 lb.) of cement: 67.87

REMARKS:

PREPARED BY:

Royden J. Crivello

Royden J Crivello
Division Manager
Con-Agg of Hawaii • Yamada and Sons Inc.

May 28, 2025

Date:



CON-AGG of HAWAII

A Division of Yamada and Sons, Inc.

733 KANOELEHUA AVENUE • P.O. BOX 4699 • HILO, HAWAII 96720

PHONE NO. (808) 933-8492 • FAX NO. (808) 933-8496

SIEVE ANALYSIS AND AGGREGATE DATA

Date: February 8, 2024

Sample No: 1

Matrl. Description: Fine Aggregate (#10 - ASTM D448)

Location: Stockpile

Crusher: Yamada #620

Moisture Content: 3.3%

| SIEVE SIZE | IND. WEIGHT RETAINED | ACCUM. WEIGHT RETAINED | PERCENT RETAINED | PERCENT PASSING | ASTM C 33 AASHTO M 43 MIN. % | ASTM C 33 AASHTO M 43 MAX % |
|------------|-------------------------|---------------------------|---------------------|--------------------|------------------------------------|-----------------------------------|
| 3/8" | 0.0 | 0.0 | 0.0% | 100.0% | 100.0% | 100.0% |
| #4 | 0.0 | 0.0 | 0.0% | 100.0% | 85.0% | 100.0% |
| #8 | 103.0 | 103.0 | 20.9% | 79.1% | | |
| #16 | 139.2 | 242.2 | 49.0% | 51.0% | | |
| #30 | 92.3 | 334.5 | 67.7% | 32.3% | | |
| #50 | 61.9 | 396.4 | 80.2% | 19.8% | | |
| #100 | 34.9 | 431.3 | 87.3% | 12.7% | 10.0% | 30.0% |
| #200 | 21.3 | 452.6 | 91.6% | 8.4% | | |
| PAN | | 494.0 | | | | |
| | | | | | | |

| | AASHTO METHOD | ASTM METHOD |
|--|---------------|-------------|
| Sampling Aggregates: | AASHTO T 2 | ASTM D 75 |
| Total Evaporable Moisture Content of Agg. by Drying: | AASHTO T 255 | ASTM C 566 |
| Sieve Analysis of Fine and Coarse Aggregates: | AASHTO T 27 | ASTM C 136 |
| Reducing Field Samples of Aggregate to Testing Size: | AASHTO T 248 | ASTM C 702 |

| Deleterious Substance and Physical Properties | Actual | Requirements | AASHTO Method | ASTM Method |
|---|-----------------|---|---------------|-------------|
| Sand Equivalent | 76.8% | >70.0% | AASHTO T 176 | N/A |
| Soundness | 1.0 | 10 Maximum | AASHTO T 104 | N/A |
| Abrasion of Parent Material | 25.2% | <40.0% | AASHTO T 96 | ASTM C 131 |
| Organic Impurities | No Color Change | Not darker than the reference standard color. | AASHTO T 21 | ASTM C 40 |
| Coal and Lignite | N/A | 1 Maximum | AASHTO T 113 | ASTM C 123 |

SSD Spec. Gravity: 2.87

Absorbtion: 2.10%

Royden J. Crivello

Royden J. Crivello

Division Manager

Con-Agg of Hawaii • Yamada and Sons, Inc.

February 8, 2024

Date:

**PORTLAND LIMESTONE CEMENT CONFORMING TO
ASTM C595/C595M-21 TYPE IL, SCG Bangkok Thailand**

| Physical properties | Unit | Specification | Test Results | Test Method |
|-------------------------|--------------------|---------------|----------------|------------------|
| Air content of mortar | % | 12 Max | 9.5 | ASTM C 185 |
| Autoclave expansion | % | 0.80 Max | 0.03 | ASTM C151/C151M |
| Blaine | cm ² /g | A | 4470 | ASTM C 204 |
| Mass density | g/cm ³ | A | 3.14 | ASTM C 188 |
| Heat of Hydration | J/g(cal/g) | ** | 301 | ASTM C1702 |
| Mortar Bar Expansion * | % | < 0.020 | 0.004 | ASTM C1038 |
| Sulfate Resistance | % | 0.10 Max *** | 0.07 | ASTM C1012 |
| | | | | |
| | | | | |
| Compressive Strength | | | | |
| 3 days | PSI/MPa | 1890 (13.0) | 5190 (35.8) | ASTM C 109/C109M |
| 7 days | | 2900 (20.0) | 6000 (41.3) | |
| 28 days | | 3620 (25.0) | 7250 (49.9) | |
| Time of setting (Vicat) | | | | |
| Initial set | Minutes | 45 Min | 110 | ASTM C 191 |
| Final set | | 420 Max | 195 | |
| Retained content on | | | | |
| .+Sieve 45µm | % | 10.0 Max | 2.3 | ASTM C 430 |
| Chemical properties | | | | |
| MgO | % | A | 1.1 | ASTM C114 |
| SO3 | % | 3.0 Max* | 2.7 | |
| Loss on ignition (LOI) | % | 10 Max | 5.1 | |
| Insoluble Residue | % | A | Mill Cert-0.27 | |
| Limestone in cement | % | 5.0-15.0 | 8.50 | |
| CaCO2 in Limestone | % | 70 or > | 94.45 | |
| SiO2 | % | A | 19.0 | |
| Al2O3 | % | A | 4.0 | |
| Fe2O3 | % | A | 2.9 | |
| CaO | % | A | 64.5 | |
| K2O | % | A | 0.43 | |
| Na2O | % | A | 0.17 | |
| R2O (Total alkalis) | % | A | 0.45 | |
| Chloride content | % | A | 0.05 | |

Remark:

This cement meets ASTM C595 and AASHTO M240 Specification for Type IL Portland Limestone Cement.

A = Not applicable.

** = Default table maximum may be exceeded if C1038/C1038M limit is met.*

*** = Meets 3d Moderate Heat – MH*

****=Meets 180d Moderate Sulfate – MS*

May 22, 2025



Daniel K. Paaaina III

Chemist

Master Builders Solutions Admixtures US, LLC



May 27, 2025

Yamada and Sons, Inc.
733 Kanoelehua Ave.
Hilo, Hawaii 96720

Attention: **Royden Crivello**
Project: **Various Projects**
Project location: **Various Locations**

Certificate of Conformance
MasterCell® 25
Master Builders Solutions Controlled Low Strength Materials (CLSM) Admixture

I, Richard Hubbard, Sr. Technical Marketing Specialist for Master Builders Solutions, Cleveland, Ohio, certify:

That MasterCell 25 admixture is a Master Builders Solutions Admixture for Controlled Low Strength Materials (CLSM); and

That MasterCell 25 and Rheocell Rheofill admixture are the same product having identical composition, differing only in designation; and

That MasterCell 25 admixture is a concentrated, self-contained product designed for use in various flowable fill applications where reduced densities and air contents of up to 35% are desired; and

That MasterCell 25 admixture meets the requirements of ASTM C260, the Standard Specifications for Air-Entraining Admixtures for Concrete, as well as the requirements for air-entraining admixtures as specified in Corps of Engineers' CRD C13 and AASHTO M154.

A handwritten signature in black ink that reads "Richard Hubbard III". The signature is stylized with a large "R" and a prominent "H".

Richard Hubbard
Sr. Technical Specialist

MasterCell[®] 25

Admixture for Controlled Low Strength Materials (CLSM)

Description

MasterCell 25 admixture is a ready-to-use, self-contained product for use in various flowable fill applications where reduced densities (unit weights) and air contents of up to 35% are desired.

Applications

Recommended for use in:

- Backfill (flowable fill) – sewer trenches, utility trenches, bridge abutments, retaining walls, conduit trenches, etc.
- Structural Fill – foundation sub bases, floor slab bases, pipe bedding

Features

MasterCell 25 admixture produced CLSM can be used in any application in lieu of compacted soil. MasterCell 25 admixture is used in flowable fill mixes to lower the density (unit weight), eliminate settlement, and to control strength development. It produces stable air contents of 15-35% and reduces water content by as much as 50%.

Benefits

- Increased yield
- Optimum workability – can be produced in either fluid or plastic consistency
- Increased pumpability
- Little or no bleeding
- No segregation
- Reduced shrinkage
- Reduced settlement
- Control of strength development
- Cost-effective compared to in-place cost of compacted soil

Performance Characteristics

Technical Data*

| | Mix 1 1 yd ³ (0.8 m ³) Load | Mix 2 4 yd ³ (3 m ³) Load |
|--|--|--|
| Cement, lb/yd ³ (kg/m ³) | 95 (56) | 100 (60) |
| Sand, lb/yd ³ (kg/m ³) | 2,260 (1,340) | 2,220 (1,320) |
| Water, lb/yd ³ (kg/m ³) | 171 (100) | 177 (105) |
| MasterSet AC 534 admixture, fl oz/cwt (mL/100 kg) | 16 (1,040) | — |
| MasterCell 25 admixture | 1 Small Bag | 1 Large Bag |
| Air Content | 33% | 35% |
| Compressive Strength, psi (MPa) | | |
| @ 28 Days | 110 (0.8) | 40 (0.3) |
| @ 58 Days | 160 (1.1) | 60 (0.4) |

*Based on field trials using specific set of materials. Results will vary depending on local materials and ambient conditions. Trial mixtures are strongly recommended to determine performance characteristics with local materials.

Note: Setting times may be extended when high air content producing materials are used. If an earlier load bearing (set) time is desired, an accelerating admixture may be used in the flowable fill mixture.

Guidelines for Use

MasterCell 25 admixture is a powdered material packaged in a ready-to-use disintegrative bag. MasterCell 25 admixture is formulated for use in producing flowable fill mixtures. It is not recommended for use in conventional concrete.

MasterCell 25 admixture performs best when added to mixes with an initial slump of 1-3 in. (25-75 mm). If necessary, the water content of the mix should be adjusted to obtain a maximum 3 in. (75 mm) initial slump. The MasterCell 25 admixture bag is simply tossed into the truck hopper and mixed with the previously batched materials for a minimum of 5 minutes at slow mixing speed. It is not necessary to wash down the hopper after adding MasterCell 25 admixture.

MasterCell 25 admixture may be added at the jobsite or at the ready-mixed concrete plant.

Storage and Handling

Storage Temperature: MasterCell 25 admixture should be stored in a dry area at temperatures below 130 °F (54 °C).

Handling: The use of gloves and goggles are recommended when handling MasterCell 25 admixture.

Shelf Life: MasterCell 25 admixture has a minimum shelf life of 12 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterCell 25 admixture has been exceeded.

Packaging

MasterCell 25 admixture is available in two sizes. The small bag will treat 1 yd³ (0.8 m³) and the large bag will treat 4 yd³ (3 m³). MasterCell 25 admixture is supplied by the case:

- 1 yd³ (0.8 m³) bag – 40 bags per case
- 4 yd³ (3 m³) bag – 20 bags per case

Related Documents

Safety Data Sheets: MasterCell 25 admixture

Additional Information

For additional information on MasterCell 25 admixture, contact your local sales representative.

Master Builders Solutions creates technologies for the construction industry inspiring people to build better. We are active in ~40 countries and operate 35 production sites with over 1,600 employees. We develop, produce, and market high-quality chemical admixtures, as well as adjacent core technologies, to master the challenges of today and support a decarbonized future. Our people are pivotal and pair leading technologies and a strong brand heritage to surpass our customers' expectations and drive continuous value creation.

Limited Warranty Notice

Master Builders Solutions Admixtures US, LLC ("Master Builders Solutions") warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control. MASTER BUILDERS SOLUTIONS MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS. The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is shipment to purchaser of product equal to the amount of product that fails to meet this warranty or refund of the original purchase price of product that fails to meet this warranty, at the sole option of Master Builders Solutions. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. MASTER BUILDERS SOLUTIONS WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND.

Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on Master Builders Solutions' present knowledge and experience. However, Master Builders Solutions assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. Master Builders Solutions reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.

Master Builders Solutions Admixtures US, LLC



May 27, 2025

Yamada and Sons, Inc.
733 Kanoelehua Ave.
Hilo, Hawaii 96720

Attention: **Royden Crivello**
Project: **Various Projects**
Project location: **Various Locations**

Certificate of Conformance
MasterPozzolith® 322
Master Builders Solutions Admixture

I, Richard Hubbard, Sr. Technical Marketing Specialist for Master Builders Solutions, Cleveland, Ohio, certify:

That MasterPozzolith 322 admixture is a Master Builders Solutions Water-Reducing Admixture for concrete; and

That MasterPozzolith 322 and Pozzolith 322N admixture are the same product having identical composition, differing only in designation; and

That no calcium chloride or chloride based ingredient is used in the manufacture of MasterPozzolith 322 admixture; and

That MasterPozzolith 322 admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00024 percent (2.4 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 MasterPozzolith 322 admixture meets the requirements for a Type A, Water Reducing, Type B, Retarding, and Type D, Water Reducing and Retarding Admixture specified in ASTM C494/C494M and AASHTO M194, the Standard Specification for Chemical Admixtures for Concrete, as well as the requirements for Type A, Type B and Type D admixtures as specified in Corps of Engineers' CRD-C 87.

A handwritten signature in black ink that reads "Richard Hubbard III".

Richard Hubbard
Sr. Technical Specialist

| | |
|----------|------------------------|
| 03 30 00 | Cast-in-Place Concrete |
| 03 40 00 | Precast Concrete |
| 03 70 00 | Mass Concrete |

MasterPozzolith[®] 322

Water-Reducing Admixture

Description

MasterPozzolith 322 ready-to-use, liquid admixture is used for making more uniform and predictable quality concrete. It meets ASTM C 494/C 494M requirements for Type A, water-reducing, Type B, retarding, and Type D, retarding and water-reducing, admixtures.

Applications

Recommended for use in:

- Prestressed concrete
- Precast concrete
- Reinforced concrete
- Shotcrete
- Lightweight concrete
- Pumped concrete
- 4x4[™] Concrete
- Pervious concrete
- Self-consolidating concrete (SCC)

Features

- Reduced water content required for a given workability
- Normal setting characteristics

Benefits

- Improved workability
- Reduced segregation
- Superior finishing characteristics for flatwork and cast surfaces
- Increased compressive and flexural strengths

Performance Characteristics

Mix Data: 400 lb/yd³ (237 kg/m³) of Type I cement; slump 5 inches (125 mm); non-air-entrained concrete; concrete temperature 76 °F (24 °C); ambient temperature 74 °F (23 °C).

Setting Time

| Mix Design | Initial Set (h:min) | Difference (h:min) |
|---------------------------------|---------------------|--------------------|
| Plain Concrete | 5:20 | REF |
| MasterPozzolith 322 admixture @ | | |
| 3 fl oz/cwt (195 mL/100 kg) | 5:15 | -0:05 |
| 5 fl oz/cwt (325 mL/100 kg) | 5:40 | +0:20 |
| 7 fl oz/cwt (460 mL/100 kg) | 6:20 | +1:00 |

Compressive Strength

| Mix Design | psi | 7 Days | | psi | 28 Days | |
|---------------------------------|------|--------|-----|------|---------|-----|
| | | MPa | % | | MPa | % |
| Plain Concrete | 2150 | 14.8 | 100 | 3070 | 21.2 | 100 |
| MasterPozzolith 322 admixture @ | | | | | | |
| 3 fl oz/cwt (195 mL/100 kg) | 2820 | 19.4 | 131 | 3970 | 27.4 | 129 |
| 5 fl oz/cwt (325 mL/100 kg) | 3160 | 21.8 | 147 | 4100 | 28.3 | 134 |
| 7 fl oz/cwt (460 mL/100 kg) | 3190 | 22.0 | 148 | 4390 | 30.3 | 143 |

Note: The data shown are based on controlled laboratory tests. Reasonable variations from the results shown here may be experienced as a result of differences in concrete-making materials and jobsite conditions.

Setting time of concrete is influenced by the chemical and physical composition of the basic ingredients of the concrete, the temperature of the concrete and the climactic conditions. Trial mixes should be made with job site materials to determine the dosage required for specified setting time and a given strength requirement.

Guidelines for Use

Dosage: MasterPozzolith 322 admixture is recommended for use within a range of 3-7 fl oz/cwt (195-460 mL/100 kg) of cement for most concrete mixtures using average concrete ingredients. Because of variations in job conditions and concrete materials, dosages other than the recommended amounts may be required. In such cases, contact your local sales representative.

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: MasterPozzolith 322 admixture will neither initiate nor promote corrosion of reinforcing steel in concrete. This admixture does not contain intentionally-added calcium chloride or other chloride-based ingredients.

Compatibility: MasterPozzolith 322 admixture may be used in combination with any Master Builders Solutions admixtures. When used in conjunction with other admixtures, each admixture must be dispensed separately into the mixture.

Storage and Handling

Storage Temperature: MasterPozzolith 322 admixture should be stored above freezing temperatures. If MasterPozzolith 322 admixture freezes, thaw at temperatures above 35 °F (2 °C) and completely reconstitute by mild mechanical agitation. **Do not use pressurized air for agitation.**

Shelf Life: MasterPozzolith 322 admixture has a minimum shelf life of 18 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterPozzolith 322 admixture has been exceeded.

Packaging

MasterPozzolith 322 admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

Related Documents

Safety Data Sheets: MasterPozzolith 322 admixture

Additional Information

For additional information on MasterPozzolith 322 admixture, contact your local sales representative.

Master Builders Solutions, a brand of MBCC Group, is a global leader of innovative chemistry systems and formulations for construction, maintenance, repair and restoration of structures. The Admixture Systems business provides advanced products, solutions and expertise that improve durability, water resistance, energy efficiency, safety, sustainability and aesthetics of concrete structures, above and below ground, helping customers to achieve reduced operating costs, improved efficiency and enhanced finished products.

Utilizing worldwide resources, the Master Builders Solutions community of experts are passionate about providing solutions to challenges within all stages of construction, as well as the life cycle of a structure. At Master Builders Solutions we create sustainable solutions for construction around the globe.

Limited Warranty Notice

Master Builders Solutions Admixtures US, LLC ("Master Builders Solutions") warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control. MASTER BUILDERS SOLUTIONS MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS. The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is shipment to purchaser of product equal to the amount of product that fails to meet this warranty or refund of the original purchase price of product that fails to meet this warranty, at the sole option of Master Builders Solutions. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. MASTER BUILDERS SOLUTIONS WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND.

Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on Master Builders Solutions' present knowledge and experience. However, Master Builders Solutions assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. Master Builders Solutions reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.

