

Testing, Findings and Endorsement of Gla-Zit®

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TWIN CITY TESTING
CORPORATION

662 CROMWELL AVENUE
ST. PAUL, MN 55114
PHONE 612/645-3601

REPORT OF: TEST OF GLA-ZIT WATERPROOFING CONCENTRATE
PROJECT: MATERIAL CHECK

PROJECT:

REPORTED TO:

H & O Sales Company
Division of Gla-Zit Inc
Attn: O M Rogness
271 Wilson Avenue SW
Cedar Rapids, IA 52404

DATE: December 5, 1986

FURNISHED BY:

COPIES TO:

LABORATORY No. 4124 86-1500

INTRODUCTION:

This report presents the results of laboratory testing performed by our firm on one sample of Gla-Zit waterproofing concentrate. A one-half gallon sample was submitted to our laboratory by Mr O M Rogness of H & O Sales Division, Gla-Zit Incorporated on June 16, 1986. The purpose of our testing was to document the chloride content at various depths in concrete treated with Gla-Zit waterproofing concentrate, as compared to a control sample made with Type IA cement. The scope of our work was limited to: 1) preparing 12" x 12" x 3" thick concrete samples using locally available materials, 2) ponding the surface of the hardened concrete samples with a 15% NaCl solution for a period of four weeks, 3) obtaining chloride dust samples at various depths, and 4) documenting the water soluble chloride content of the concrete dust samples.

Our work was requested and authorized by Mr O M Rogness of H & O Sales Division, Gla-Zit Incorporated, Cedar Rapids, Iowa, on June 30, 1986.

SAMPLE IDENTIFICATION:

Sample Number -	1
Sample Name -	Gla-Zit
Type of Sample -	Ad-mix waterproofing concentrate
Manufacturer -	Gla-Zit Incorporated
Date Submitted -	June 16, 1986
Sample Size -	1/2 Gallon

TEST PROCEDURES:

Laboratory testing was performed on August 26, 1986 and subsequent dates. Our procedures were as follows:

Sample Preparation:

1. The concrete was batched in volumes of approximately 1.5 cubic feet in our laboratory using the mix designs included in the section of this report titled "Mix Proportions."



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ST. PAUL, MN 55114
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REPORT OF: TEST OF GLA-ZIT WATERPROOFING CONCENTRATE

LABORATORY No. 4124 86-1500

DATE: December 5, 1986

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TEST PROCEDURES: (cont)

Sample Preparation: (cont)

2. The moisture contents of the aggregates were recorded, and the batch weights adjusted for the free moisture in the aggregate.
3. After mixing the concrete, the plastic concrete was tested to document the slump, air content, temperature and unit weight. Slump testing was performed in accordance with ASTM:C143, "Standard Test Method for Slump of Portland Cement Concrete." The air content of the concrete was tested by the pressure method according to ASTM:C231, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method." The unit weight testing was performed in accordance with ASTM:C138, "Standard Test Method for Unit Weight, Yield and Air Content of Concrete."
4. At the completion of testing, two, 12" x 12" x 3 1/2" thick concrete samples were prepared. The first sample contained Gla-Zit at a dosage rate of four ounces per sack of cement. The second sample was a control sample, utilizing Type IA cement.
5. The samples were allowed to cure in our laboratory (73°F, 50% R.H.) for a period of twenty-eight days prior to further testing.

Chloride Ponding:

At the completion of curing, a 1" mortar dike was constructed around the perimeter of each sample. A 15% NaCl solution was ponded on the surface of each sample for a period of four weeks. Water was added daily to maintain the proper depth of solution. Once a week, the solution was flushed off the surface of each sample thoroughly and the solution replaced.

Chloride Content Sampling and Testing:

At the completion of ponding, chloride dust samples were obtained by drilling to depths of 0" to 1/2", 1/2" to 1 1/2" and 1 1/2" to 2 1/2" at three locations. The three dust samples were combined to form one composite sample. The water soluble chloride content was documented using a Corning digital specific ion meter equipped with a specific ion electrode. Chloride content testing was performed in accordance with Federal Highway Administration Test Method (FHWA-RD-77-85) procedures.


TWIN CITY TESTING
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 ST. PAUL, MN 55114
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REPORT OF: TEST OF GLA-ZIT WATERPROOFING CONCENTRATE

LABORATORY No. 4124 86-1500

DATE: December 5, 1986

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MIX PROPORTIONS:
Materials:

Cement -	A. Davenport Type IA Portland (ASTM:C150)
	B. Huron Type I Portland (ASTM:C150)
Fine Aggregate -	Sand, furnished by J L Shiely Company (ASTM:C33)
Coarse Aggregate -	3/4" Gravel, furnished by J L Shiely Company (ASTM:C33)
Admixture -	A. Prokrete N, furnished by Protex Industries (ASTM:C494, Type A)
	B. Gla-Zit Waterproofing Concentrate

Batch Weights:

	<u>Batch Number</u>	
	1	2
Cement, lbs (A) -	537	---
(B) -	---	557
Fine Aggregate, lbs -	1290	1337
Coarse Aggregate, lbs -	1743	1806
Water, lbs -	263	262
Admixture, oz (A) -	16.9	16.9
(B) -	----	22.6
W/C Ratio -	0.49	0.47

TEST RESULTS:
Plastic Concrete:

	<u>Batch Number</u>	
	1	2
Slump, in	3 1/2	3 1/2
Air Content, %	5.8	3.9
Temperature, °F -	75	76
Unit Weight, pcf -	143.5	148.2



twin city testing
corporation

662 CROMWELL AVENUE
ST. PAUL, MN 55114
PHONE 612/645-3601

REPORT OF: TEST OF GLA-ZIT WATERPROOFING CONCENTRATE

LABORATORY No. 4124 86-1500

DATE: December 5, 1986

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TEST RESULTS: (cont)

Water Soluble Chloride Content:

<u>Depth, in</u>	<u>Control</u>	<u>4 oz/Sack</u>
0" to 1/2"	6960	5710
1/2" to 1 1/2"	1220	500
1 1/2" to 2 1/2"	859	390

METHOD PRECISION FOR WATER SOLUBLE CHLORIDE:

Control limits for the method were established after a quality check sample of hardened Portland cement concrete was analyzed eighty-six times. The results of the determinations yielded the following:

Mean Value, X (n=86)	107 ppm
Standard Deviation, S	12 ppm
Upper Control Limit, (X + 3S)	143 ppm
Lower Control Limit, (X - 3S)	71 ppm

The check sample, analyzed along with the samples for this project, contained 112 ppm and 114 ppm, indicating that the system was in control.

REMARKS:

The test samples will be retained by our laboratory for a period of two weeks from the date of this report. Unless further instructions are received by that time, the samples will be discarded.

TWIN CITY TESTING CORPORATION

Therese M Collins

Therese M Collins
Civil Engineer
Construction Materials Dept

TMC/ve

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.



ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

REPORT OF: TEST OF MASONRY WATERPROOFING PRODUCT



PROJECT: FREEZING AND THAWING TESTS

DATE: July 8, 1968

REPORTED TO: H and O Sales Company
271 Wilson Avenue Southwest
Cedar Rapids, Iowa 52404
Attn: Mr. O. M. Rognes

FURNISHED BY:

COPIES TO:

LABORATORY No. 6-3865

GENERAL:

A sample of Gla-Zit waterproofing product was submitted to the laboratory and tests were conducted to determine the improved resistance of concrete to freezing and thawing conditions with the addition of Gla-Zit admixture.

SAMPLE IDENTIFICATION:

One gallon, Gla-Zit waterproofing product, manufactured by the Cle-Vac Company, Iowa Falls, Iowa. The sample was submitted to the laboratory by the H and O Sales Company, Cedar Rapids, Iowa.

TEST METHOD:

Three concrete mixes were proportioned using Type I Portland Cement, sand, 3/4 inch gravel and water. Two plain mixes were made, one containing one pint per cubic yard Gla-Zit admixture. The third concrete mix was air-entrained and contained the same dosage of Gla-Zit. Specimens were cast from each concrete mix and after 28 days moist curing were subjected to an accelerated freezing and thawing test. This test consisted of ten cycles of alternate wetting and drying with a sodium sulfate salt solution. At the conclusion of ten cycles, the samples were washed and dried and the weight loss was determined.

TEST RESULTS:

Concrete Mix Observations	Regular Concrete with Gla-Zit Admixture		Air-entrained Concrete with Gla-Zit Admixture
	Cycle 4	Cycle 6	Cycle 9
1st Spalling noted			
Weight loss after 10 Cycles			
Specimen 1	2.0	1.4	Trace
2	1.8	0.5	None
3	2.3	1.0	0.1
4	2.0	0.3	None
5	2.4	0.9	None
6	2.4	0.7	0.3
Average	2.15	0.80	0.07

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.

ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

REPORT OF: TEST OF MASONRY WATERPROOFING PRODUCT



DATE: July 8, 1968

PAGE: 2

LABORATORY No. 6-3865

REMARKS:

The above tests indicate that the nonair-entrained concrete had a greater resistance to freezing and thawing conditions when the Gla-Zit admixture was included at a rate of one pint per cubic yard. It should be noted however, that the air-entrained concrete with Gla-Zit added has a greater resistance to freezing and thawing than either of the regular concrete mixtures.

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Twin City Testing and Engineering Laboratory, Inc.

By Theodore Johnson



COMPRESSION TESTS OF CONCRETE CYLINDERS

PROJECT: FAITH AND LIFE CENTER-LUTHER COLLEGE **DATE REPORTED:** 10-1-75, 10-27-75
DECORAH, IOWA

REPORTED TO: Black Hawk Construction **COPIES TO:** (2) Gray and Lynnes Architects
Box 183 217½ West Water Street
(3) Waterloo, Iowa 50704 Decorah, Iowa 52101
(1) Carlson Materials Co.

<u>FIELD DATA:</u>				
* Job Identification _____	18A	18B	18C	
* Date Cast _____	9-24-75	9-24-75	9-24-75	
* Age to be Tested, days _____	7	28	28	
Slump _____				
Air Content _____				
* Location of Placement _____	Wall 151 to 147			
* Specified Strength @ 28 days _____	5000 psi			
* Mix Proportions: _____	5R			
Cement _____	705 lbs			
Fine Aggregate _____				
Coarse Aggregate _____				
Admixture _____	Gla-Zit			
Concrete Furnished by _____	Carlson Ready Mix			
<u>COMPRESSIVE STRENGTH:</u>				
	Test Method - ASTM C39, 6" X 12" Cylinder, Area 28.1 Sq. In.			
Laboratory Number _____	74874-1	74874-2	74874-3	
Date Received _____	9-29-75	9-29-75	9-29-75	
Method of Curing:				
Days on Job & Enroute _____	5	5	5	
Days Lab. Cured-ASTM C192 _____	2	23	23	
Age at Test, days _____	7	28	28	
Load at Failure, pounds _____	127,500	210,500	219,500	
Strength, psi. _____	4540	7490	7810	

REMARKS: * Information taken from field data sheet prepared by Mr. Engrav.

OCT 9 1975

Twin City Testing and Engineering Laboratory, Inc.
By *PE Peltier*



COMPRESSION TESTS OF CONCRETE CYLINDERS

PROJECT: FAITH AND LIFE CENTER - LUTHER COLLEGE DATE REPORTED: 8-27-75
DECORAH, IOWA

REPORTED TO: Black Hawk Construction
Box 183
(3) Waterloo, Iowa 50704

COPIES TO: (2) Gray and Lynnes Architect
217 1/2 West Water Street
Decorah, Iowa 52101
(1) Carlson Materials Co,

<u>FIELD DATA:</u>			
* Job Identification _____	9A	9B	9C
* Date Cast _____	8-4-75	8-4-75	8-4-75
* Age to be Tested, days _____	7	7	7
Slump _____	2 1/2"	2 1/2"	2 1/2"
Air Content _____			
* Location of Placement _____	Footings pad - 160; 129-128		
* Specified Strength @ 28 days _____	4000 psi		
Mix Proportions: _____	564 lbs.		
Cement _____			
Fine Aggregate _____			
Coarse Aggregate _____			
Admixture _____	Gla=Zit		
* Concrete Furnished by _____	Carlson Materials Co.		
<u>COMPRESSIVE STRENGTH:</u>			
	Test Method - ASTM C39, 6" X 12" Cylinder, Area 28.1 Sq. In.		
Laboratory Number _____	74764-1	74764-2	74764-3
Date Received _____	8-21-75	8-21-75	8-21-75
Method of Curing:			
Days on Job & Enroute _____	17	17	17
Days Lab. Cured-ASTM C192 _____	4	4	4
Age at Test, days _____	21	21	21
Load at Failure, pounds _____	167,000	167,500	167,500
Strength, psi. _____	5940	5960	5960

REMARKS: * Information taken from field data sheet prepared by Mr. Engrav.

Twin City Testing and Engineering Laboratory, inc.
By *P. E. Petzel*
SEP - 5 1975

DATE Oct. 16, 1974 JOB NO. ----

CONTRACTOR Ossola Const. Co.

ADDRESS Granville, Ill.

CONCRETE PRODUCER Ossola

PROJECT Consolidated Grain Co.

MIDWEST
Testing Services, Inc.

626 East Van Buren Street
Ottawa, Illinois 61350

ARCHITECT _____

REPORT NO. 3

COMPRESSIVE STRENGTH OF MOLDED CONCRETE CYLINDERS

LAB. CYL. NUMBER	LOCATION OF POUR	DATE MADE	DATE TESTED	MAXIMUM LOAD-LBS.	COMP. STRENGTH IN P. S. I.	SPECIFIED STRENGTH IN P. S. I.	AGE IN DAYS	MIX NO. CEMENT	SLUMP IN.	Air %
4	Well Bent #2	10-2	10-9	129,000	4,563		7	470 lbs		
5	Tunnel	10-5	10-12	132,000	4,669		"	"		
6	Bent #2	10-5	10-12	129,000	4,563		"	"		
7	---	9-30	10-13	169,000	5,978		14	"		

UNLESS OTHERWISE NOTED, CYLINDERS ARE 6" DIA. x 12" LONG WITH CROSS SECTIONAL AREA OF 28.27 SQUARE INCHES.

COPIES TO: (2) Ossola

BY: J. Safrenski

MIDWEST TESTING SERVICES, INC.

PROJECT Consolidated Grain Co.

DATE Oct. 23, 1974 JOB NO. P----

MIDWEST

CONTRACTOR Ossola Construction Co.

Testing Services, Inc.

ADDRESS Granville, Ill.

626 East Van Buren Street

CONCRETE PRODUCER Ossola

Ottawa, Illinois 61350

ARCHITECT

4 COMPRESSIVE STRENGTH OF MOLDED CONCRETE CYLINDERS

LAB. CYL. NUMBER	LOCATION OF POUR	DATE MADE	DATE TESTED	MAXIMUM LOAD-LBS.	COMP. STRENGTH IN P. S. I.	SPECIFIED STRENGTH IN P. S. I.	AGE IN DAYS	MAX. MO. CEMENT	SLUMP IN.	AIR %
8	Bent 2 Wall	10-2	10-16	146,000	5,164	--	14	470 lbs.	--	--
9	Bent 3	10-5	10-19	135,000	4,775	--	"	"	--	--
10	Tunnel	10-5	10-19	157,000	5,553	--	"	"	--	--
11	Bent 3	10-8	10-15	89,000	3,148	--	7	"	--	--
12	Tunnel Deck	10-17	10-22	106,000	3,749	--	5	"	--	--

UNLESS OTHERWISE NOTED, CYLINDERS ARE 6" DIA. x 12" LONG WITH CROSS-SECTIONAL AREA OF 28.27 SQUARE INCHES.

DATE Sept. 30, 1974 JOB NO.

PROJECT Consolidated Grain Co.

CONTRACTOR Ossola Construction Co.

MIDWEST

ADDRESS Granville, Ill.

Testing Services, Inc.

CONCRETE PRODUCER Ossola

626 East Van Buren Street

ARCHITECT

Ottawa, Illinois 61350

REPORT NO. 1

COMPRESSIVE STRENGTH OF MOLDED CONCRETE CYLINDERS

LAB. CYL. NUMBER	LOCATION OF POUR	DATE MADE	DATE TESTED	MAXIMUM LOAD-LBS.	COMP. STRENGTH IN P. S. I.	SPECIFIED STRENGTH IN P. S. I.	AGE IN DAYS	MIX NO.	SLUMP IN.	AIR %
1	Roadway	9-27	9-29	124,000	4,386	--	2	8 Bag	1 1/2	--
2	"	"	"	118,000	4,174	--	"	"	"	--

LESS OTHERWISE NOTED, CYLINDERS ARE 6" DIA. x 12" LONG
11" CROSS-SECTIONAL AREA OF 28 27 SQUARE INCHES.

MIDWEST TESTING SERVICES, INC.

PIES TO: (2) Ossola

By J. Safraneki



AREA CODE 314

GAMPCO INCORPORATED
CONTRACTORS AND ENGINEERS

11937 DORSETT ROAD • MARYLAND HEIGHTS,
 MISSOURI 63043



PHONE: 739-0616

October 3, 1975

Mr. O. M. Rogness
 H 7 O Sales Division
 Gla-zit, Inc.
 271 Wilson Ave. S.W.
 Cedar Rapids, Iowa 52404

Gentlemen:

I was on the job site last month and inspected the tunnel that was pretty much under water and there was no sign of any water or moisture coming through the concrete.

These are all the test reports that I have at this time. I hope they can help you out.

Yours truly,

GAMPCO INCORPORATED
 Contractors & Engineers

Charles Kiehn

CK/mai



Member:

AMERICAN COUNCIL of INDEPENDENT LABORATORIES, Inc.

ANCO TESTING LABORATORY, INC.1552 SOUTH 7TH, ST. LOUIS, MISSOURI 63104
707 E. McCARTY ST., JEFFERSON CITY, MISSOURI• 314-241-0525
• 314-635-5012

Report No. A-97805

February 27, 1973

H & O Sales Company
271 Wilson Avenue S.W.
Cedar Rapids, Iowa 52404Project: Gla-Zit Additive Evaluation Test
Phase: Corrosion of Embedded Items Analysis

Gentlemen:

In accordance with your instructions, we conducted Comparative Tests to establish the extent and amount of corrosion which occurs when the items noted below are embedded in plain concrete vs items embedded in concrete containing Gla-Zit additive.

Embedded Items

- 1.) Painted Metal Deck
- 2.) Galvanized Steel Plate
- 3.) Steel-Clad Conduit
- 4.) Copper Tubing

Since an ASTM Standard Method of Test to determine the corrosive effect of concrete on embedded items has not, to our knowledge, been established, the following procedures were used to compile the data and information recorded in this report.

- 1.) A Mikrotest, Model No. FIN, was used to measure the thickness of the coating on the surface of each of the steel items before and after embedment in the concrete.
- 2.) The concrete in which the items were embedded was produced with local materials. The mixes, identified hereafter as "Reference" Mix and "Gla-Zit" Mix, were specifically designed to be comparable.
- 3.) The items were removed from the 6" x 6" x 20" beams after being embedded for seven (7) and twenty-eight (28) days. Mikrotest thickness of coating measurements were made to determine logs of coating at the end of each period.

Attached to and made a part of this report are the proportions and the results of physical properties and compressive strength tests for the concrete mixes used in the test program, and a log of the loss of coating data recorded at seven (7) and twenty eight (28) days. In addition, we are attaching photographs of the embedded items.

Additional specimens are being prepared to determine the loss of coating when items are embedded for three (3), six (6) and twelve (12) months.

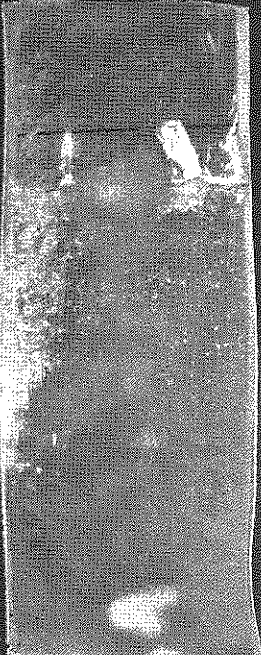
Should there be any questions regarding our report, or if we may be of further service, please advise.

Respectfully submitted,

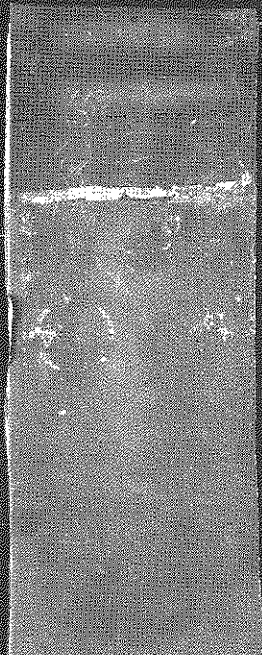
John T. Anderson
ANCO TESTING LABORATORY, INC.

JTA:de
9-H & O - Cedar Rapids
3-H & O - St. Louis

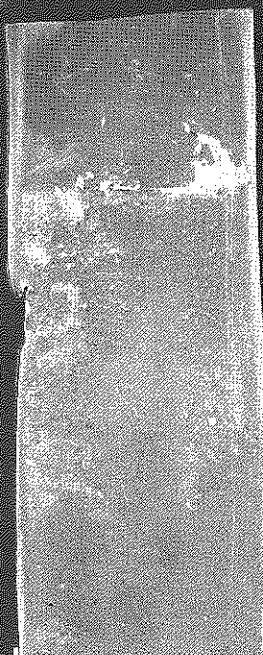
EMBEDDED ITEM - PAINTED METAL DECK



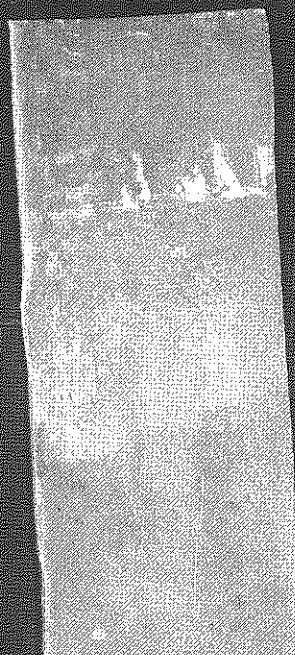
Mix: REFERENCE
 EMBEDDED: 7 DAYS
 COATING BEFORE: 0.5 MILS
 COATING AFTER: 0.4 MILS
 COATING LOSS: 0.1 MILS



Mix: GLA-21T
 EMBEDDED: 7 DAYS
 COATING BEFORE: 0.5 MILS
 COATING AFTER: 0.4 MILS
 COATING LOSS: 0.1 MILS

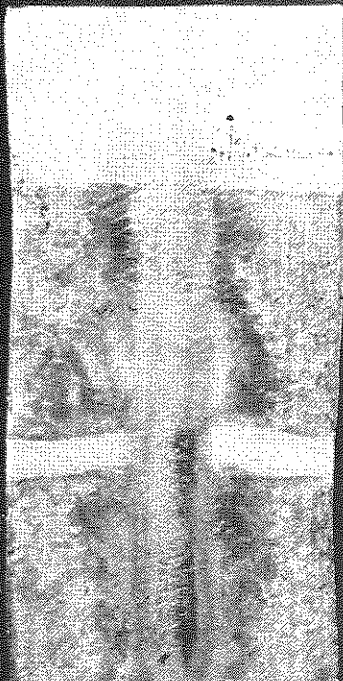


Mix: REFERENCE
 EMBEDDED: 28 DAYS
 COATING BEFORE: 0.5 MILS
 COATING AFTER: 0.4 MILS
 COATING LOSS: 0.1 MILS

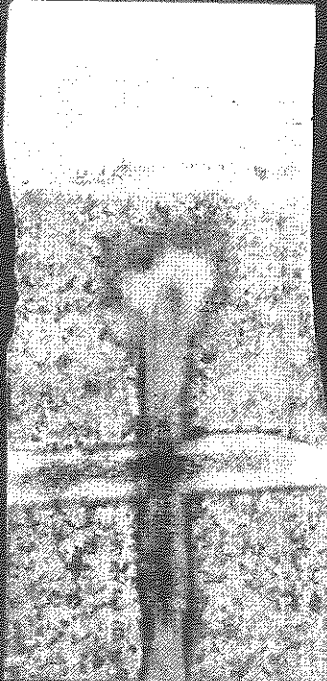


Mix: GLA-21T
 EMBEDDED: 28 DAYS
 COATING BEFORE: 0.5 MILS
 COATING AFTER: 0.4 MILS
 COATING LOSS: 0.1 MILS

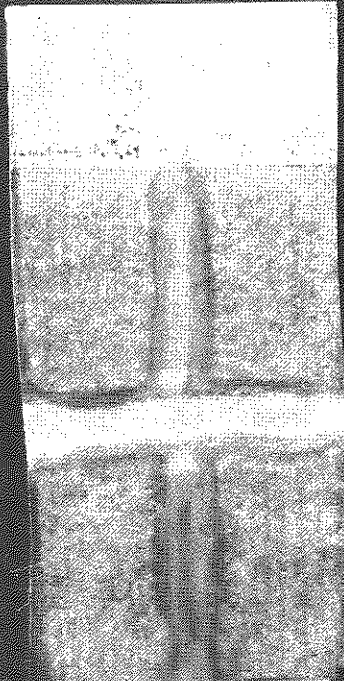
EMBEDDED ITEM - GALVANIZED STEEL PLATE



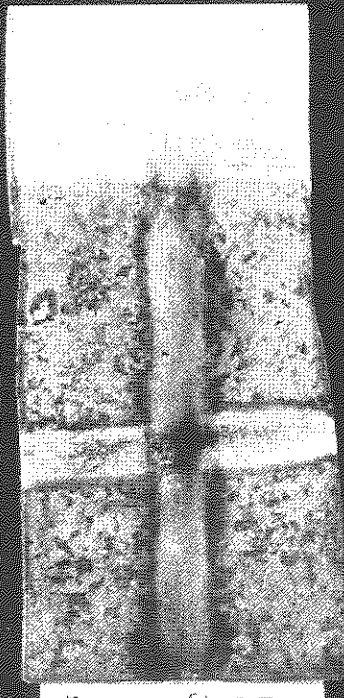
Mix: REFERENCE
 EMBEDDED: 7 DAYS
 COATING BEFORE: 0.6 MILS
 COATING AFTER: 0.5 MILS
 COATING LOSS: 0.1 MILS



Mix: GLA-21T
 EMBEDDED: 7 DAYS
 COATING BEFORE: 0.6 MILS
 COATING AFTER: 0.4 MILS
 COATING LOSS: 0.1 MILS

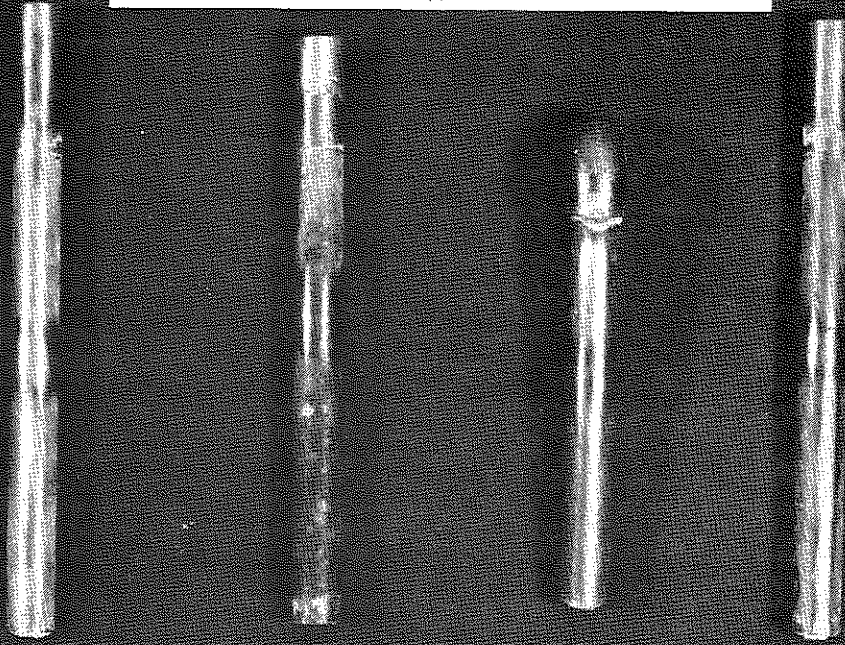


Mix: REFERENCE
 EMBEDDED: 28 DAYS
 COATING BEFORE: 0.6 MILS
 COATING AFTER: 0.7 MILS
 COATING LOSS: 0.1 MILS



Mix: GLA-21T
 EMBEDDED: 28 DAYS
 COATING BEFORE: 0.6 MILS
 COATING AFTER: 0.5 MILS
 COATING LOSS: 0.1 MILS

EMBEDDED ITEM - Copper TUBING



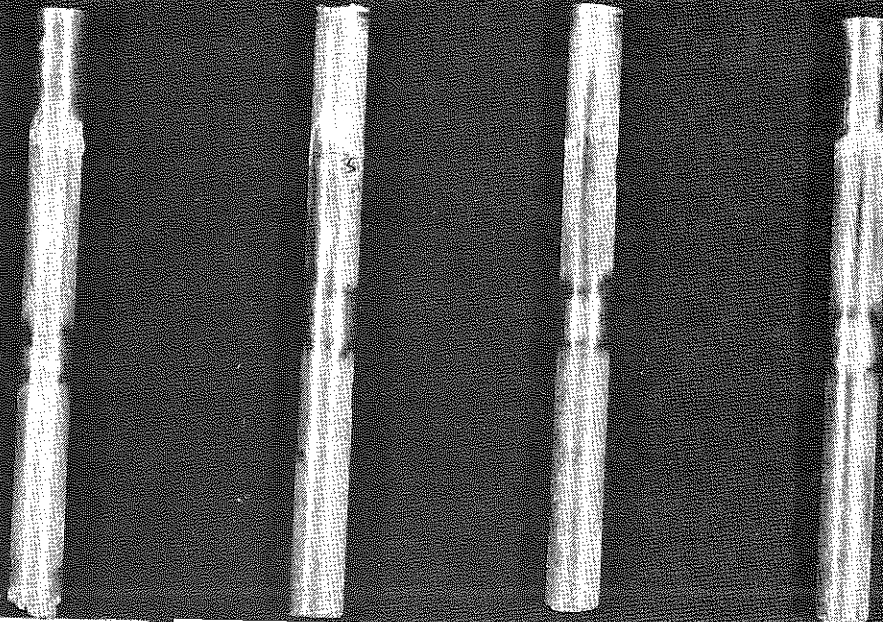
Mix REFERENCE
EMBEDDED 7 DAYS
COATING LOSS NEGLIGIBLE

Mix GLA-21T
EMBEDDED 7 DAYS
COATING LOSS NEGLIGIBLE

Mix REFERENCE
EMBEDDED 28 DAYS
COATING LOSS NEGLIGIBLE

Mix GLA-21T
EMBEDDED 28 DAYS
COATING LOSS NEGLIGIBLE

EMBEDDED ITEM - STEEL - CLAD CONDUIT

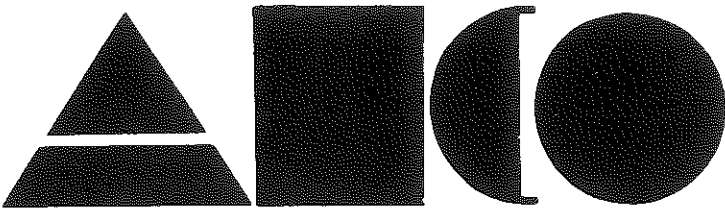


Mix REFERENCE
EMBEDDED 7 DAYS
COATING BEFORE 0.4 MILS
COATING AFTER 0.3 MILS
COATING LOSS 0.1 MILS

Mix GLA-21T
EMBEDDED 7 DAYS
COATING BEFORE 0.4 MILS
COATING AFTER 0.3 MILS
COATING LOSS 0.1 MILS

Mix REFERENCE
EMBEDDED 28 DAYS
COATING BEFORE 0.5 MILS
COATING AFTER 0.3 MILS
COATING LOSS 0.2 MILS

Mix GLA-21T
EMBEDDED 28 DAYS
COATING BEFORE 0.5 MILS
COATING AFTER 0.4 MILS
COATING LOSS 0.1 MILS



ANCO TESTING LABORATORY, INC.

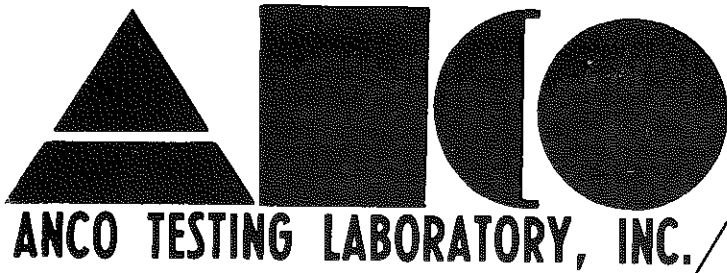
1552 SOUTH 7TH, ST. LOUIS, MISSOURI 63104
707 E. McCARTY ST., JEFFERSON CITY, MISSOURI

• 314-241-0525
• 314-635-5012

Report No. A-97805
Page No. 3

EMBEDDED ITEM LOG OF LOSS OF COATING DATA

<u>Item</u>	<u>Reference Mix Concrete</u>		<u>Gla-Zit Additive Concrete</u>	
	<u>7 Days</u>	<u>28 Days</u>	<u>7 Days</u>	<u>28 Days</u>
<u>Painted Metal Deck Embedded</u>				
Coating Before Test	0.5 Mils	0.5 Mils	0.5 Mils	0.4 Mils
Coating After Test	0.4 Mils	0.4 Mils	0.4 Mils	0.3 Mils
Coating Loss	0.1 Mils	0.1 Mils	0.1 Mils	0.1 Mils
<u>Galvanized Metal Plate</u>				
Coating Before Test	0.6 Mils	0.8 Mils	0.5 Mils	0.6 Mils
Coating After Test	0.5 Mils	0.7 Mils	0.4 Mils	0.5 Mils
Coating Loss	0.1 Mils	0.1 Mils	0.1 Mils	0.1 Mils
<u>Steel-Clad Conduit</u>				
Coating Before Test	0.4 Mils	0.5 Mils	0.4 Mils	0.5 Mils
Coating After Test	0.3 Mils	0.3 Mils	0.3 Mils	0.4 Mils
Coating Loss	0.1 Mils	0.2 Mils	0.1 Mils	0.1 Mils
<u>Copper Tubing</u>				
Coating (Oxidation) Loss	Negligible	Negligible	Negligible	Negligible



ANCO TESTING LABORATORY, INC.

Member:

AMERICAN COUNCIL of INDEPENDENT LABORATORIES, Inc.

1552 SOUTH 7TH, ST. LOUIS, MISSOURI 63104
707 E. McCARTY ST., JEFFERSON CITY, MISSOURI

• 314-241-0525
• 314-635-5012

Report No. A-97843

February 27, 1973

Project: Gla-Zit Additive Evaluation Test

Phase: Comparative Water Absorption Tests

H & O Sales Company
271 Wilson Avenue S.W.
Cedar Rapids, Iowa 52404

Gentlemen:

In accordance with your instructions, we conducted comparative tests to determine the water absorption characteristics of plain Portland Cement Concrete vs. a Gla-Zit Additive Portland Cement Concrete.


Tests were conducted in accordance with the following procedures.

- 1.) Test Specimens - 6" x 12" Concrete Cylinders.
- 2.) Specimens were dried to constant weight in an oven at 115°F to produce equilibrium between specimens.
- 3.) Specimens were either partially or totally submerged in tap water, and were weighed periodically to determine both the rate and the amount of absorption.

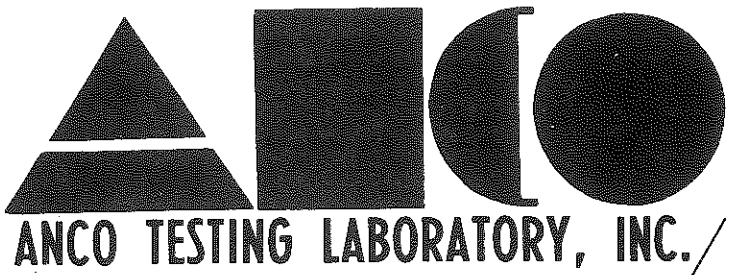
Attached to and made a part of this report are results of the tests noted above.

Should there be any questions regarding this report, or if we may be of further service, please advise.

Respectfully submitted,


John T. Anderson
ANCO TESTING LABORATORY INC.

JTA:de
9-H & O - Cedar Rapids
3-H & O - St. Louis



1552 SOUTH 7TH, ST. LOUIS, MISSOURI 63104
 707 E. McCARTY ST., JEFFERSON CITY, MISSOURI

• 314-241-0525
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Report No. A-97843
 Page No. 3

COMPARATIVE WATER ABSORPTION TEST DATA

Reference Mix Concrete

Gla-Zit Additive Mix Concrete

Specimens Partially Submerged

<u>Submerged Time-Days</u>	<u>Absorption Percent</u>	<u>Submerged Time-Days</u>	<u>Absorption Percent</u>
1	1.00	1	0.61 <i>63%</i>
3	1.24	3	0.79 <i>57%</i>
7	1.46	7	0.97 <i>51%</i>
14	1.54	14	1.12 <i>37%</i>
28	1.79	28	1.25 <i>42%</i>
56	2.08	56	1.43 <i>45%</i>

Note 1.) Identical water levels maintained throughout the test.

Note 2.) Temperature Range - Between 70°F and 73°F.

Note 3.) Relative Humidity Range - Between 35% and 42%.

Specimens Totally Submerged

<u>Submerged Time-Days</u>	<u>Absorption Percent</u>	<u>Submerged Time-Days</u>	<u>Absorption Percent</u>
1	2.84	1	2.35 <i>21%</i>
3	3.10	3	2.56 <i>21%</i>
7	3.36	7	2.79 <i>20%</i>
14	3.51	14	2.94 <i>20%</i>
28	3.69	28	3.04 <i>22%</i>
56	4.14	56	3.11 <i>33%</i>

Note 1.) Temperature of Water Range - 70°F to 72°F.

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.



ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

REPORT OF: TEST OF WATERPROOFING PRODUCT



PROJECT: WATERPROOFING

DATE: September 20, 1967

REPORTED TO: H & O Sales Company
271 Wilson Avenue Southwest
Cedar Rapids, Iowa 52404
Attention: Mr. O. M. Rogness

FURNISHED BY:

COPIES TO:

LABORATORY No. 6-3092

GENERAL:

A sample of Gla-Zit waterproofing product was submitted to the laboratory and tests were conducted to determine the waterproofing effectiveness of the compound.

SAMPLE IDENTIFICATION:

One gallon, Gla-Zit waterproofing product manufactured by the Cle-Vac Company, Iowa Falls, Iowa. The sample was submitted to the laboratory by the H & O Sales Company, Cedar Rapids, Iowa.

TEST METHOD:

A column of standard twelve inch, two-cell concrete blocks was constructed using a mortar consisting of one part of Type I Portland Cement to three parts of masonry sand. The column constructed was six blocks in height. A similar column using the same type and number of concrete blocks was constructed using a normal masonry mortar. The constructions were allowed to cure for a period of seven days and the column constructed with the use of the Portland Cement mortar was then coated as directed in the Gla-Zit manufacturer's literature. This method consisted of mixing one part of Gla-Zit to eight parts of water, the resulting solution then being mixed with Portland Cement to a thin paste. A coat of the resulting solution was then painted directly on the outer surfaces of this concrete block column. The second column was left as originally constructed. The coated column was allowed to cure for a period of three days at which time a second coat of the same Gla-Zit mixture was applied. This coating was allowed to cure for 24 hours and a third "touch-up" coating was then applied. After an additional period of 48 hours, both columns were completely filled with water. Both block columns were refilled periodically for a period of 24 hours to allow sufficient time for complete saturation of the concrete blocks. During the ensuing 48-hour period, the rate of water transmission and other observations were recorded.

TEST RESULTS:

<u>Item</u>	<u>Uncoated Column</u>	<u>Column Coated With Gla-Zit Solution</u>
Total water capacity of column (gal)	27.5	27.5
Water leakage (gal/hr)	27.4	0.02

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.

ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

TEST OF WATERPROOFING PRODUCT

REPORT OF:



DATE: September 20, 1967

PAGE: 2

LABORATORY No. 6-3092

TEST RESULTS: (Continued)

<u>Item</u>	<u>Uncoated Column</u>	<u>Column Coated With Gla-Zit Solution</u>
Type of Leakage	Leakage occurred primarily through the mortar joints present between the blocks of the column.	The rate of water transmission was very slight and no concentrated area of leakage was noted. Some very slight leakage was noted at the ends of the coated column in areas where molding cracks were originally present in the concrete block.

NOTE:

The coated block column when first filled with water, became quite damp on the outer surfaces and small beads of water appeared. After a period of 24 hours, this "sweating" condition had ceased and the block faces became dry both visibly and to the touch. The block faces on this column remained dry throughout the remainder of the test period.

The column which was not coated with the Gla-Zit solution was allowed to dry for a period of seven days. A thin paste consisting of Portland Cement and water without the Gla-Zit compound was then painted on the outer surfaces of this column. Two coats of this paste were applied to the outer surfaces of the mortar joints between the column blocks. The coating was allowed to cure for an additional seven days, and the column was again filled with water. The column so treated leaked water at a rate of 1.7 gal/hr., with most of the leakage occurring through small hairline cracks which developed in the Portland Cement-water coating. It was noted that these hairline cracks had not occurred in the coating which had contained the Gla-Zit compound.

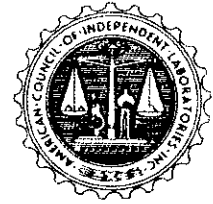
REMARKS:

The above test results indicate that the Gla-Zit compound produces a high water repellancy action when applied to masonry construction using a Portland Cement mortar.

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

Twin City Testing and Engineering Laboratory, Inc.

By Theodore Johnson



1552 SOUTH 7TH, ST. LOUIS, MISSOURI 63104
707 E. McCARTY ST., JEFFERSON CITY, MISSOURI

• 314-241-0525
• 314-635-5012

June 27, 1974

Reference: Gla-Zit Waterproofing Capabilities

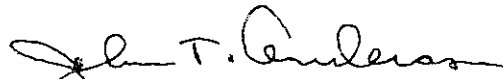
H & O Sales Company
271 Wilson Avenue Southwest
Cedar Rapids, Iowa 52404

Gentlemen:

In accordance with your request, we reviewed test data and information recorded in our Report A-97843, and results of Product Evaluation and Familiarization Tests conducted in our laboratory on samples of Gla-Zit submitted by your representative.

In our opinion, based on a survey of the accumulated data and on personal experience, Gla-Zit is a very effective waterproofing additive, when used in accordance with the manufacturer's recommendations.

Respectfully submitted,


John T. Anderson
ANCO TESTING LABORATORY, INC.

JTA:mam
6-H & O Sales
3-Bean
3-Willingham

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.

ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114



REPORT OF: TEST OF MASONRY WATERPROOFING PRODUCT

PROJECT: THERMAL SHOCK
REPORTED TO: H & O Sales Company
271 Wilson Avenue Southwest
Cedar Rapids, Iowa 52404
Attention: Mr. O. M. Rogness

DATE: July 17, 1967

FURNISHED BY:

COPIES TO:

LABORATORY No. 6-2886

GENERAL:

A sample of Gla-Zit waterproofing product was submitted to the laboratory and tests were conducted to determine the resistance of the waterproofing coating to attack by steam and by thermal shock.

SAMPLE IDENTIFICATION:

One gallon, Gla-Zit waterproofing product, manufactured by the Cle-Vac Company, Iowa Falls, Iowa. The sample was submitted to the laboratory by the H & O Sales Company, Cedar Rapids, Iowa.

TEST METHOD:

Concrete test panels, approximately 4" square and 1" thick, were thoroughly moistened with water and the waterproofing coating was then applied to one face of the test panel in accordance with directions supplied by the manufacturer's literature. The coating consisted of mixing one part of Gla-Zit to eight parts of water, the resulting solution mixed with Portland cement to a thin paste. This was then painted directly on the concrete panel with an ordinary paint brush. The coated panels were allowed to cure for a period of seven days and the following tests were then conducted: Two of the test panels were placed in an autoclave chamber and subjected to a pressure of 300 psi at a temperature of 420°F for a period of three hours. An additional two specimens were subjected to cycling between a high temperature of 230°F for a period of 24 hours and a low temperature of -16°F for a period of 24 hours. The cycling was continued for a period of eight days.

TEST RESULTS:

<u>Item</u>	<u>Sample Results</u>
Attack by Steam	No effect
Thermal Shock	No effect

REMARKS:

The above tests indicate that the Gla-Zit coating is resistant to attack by steam or severe thermal shock.

Twin City Testing and Engineering Laboratory, Inc.

By Theodore C. Johnson



Member:

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ANCO TESTING LABORATORY, INC./

1552 SOUTH 7TH, ST. LOUIS, MISSOURI 63104
707 E. McCARTY ST., JEFFERSON CITY, MISSOURI• 314-241-0525
• 314-635-5012

Report No. A-91187

June 28, 1972

Project: Gla-Zit Additive Evaluation Test

Phase: Hot Weather "Time of Setting" Characteristics

H & O Sales Company
271 Wilson Avenue S.W.
Cedar Rapids, Iowa 52404

Gentlemen:

In accordance with your instructions, we conducted comparative tests to determine the effect of hot weather temperatures on the time of setting of concrete.

The concrete mix tested was specifically designed for placement where architectural white concrete is designated in the plans and specifications for the new St. Anthony Hospital to be constructed in St. Louis County, Missouri.

Test results indicate the time of setting for each mix:

<u>Identification</u>	<u>Time of Setting</u>
Gla-Zit Concrete Mix	1.75 Hours
Reference Concrete Mix	2.30 Hours
Gla-Zit Concrete Mix	2.40 Hours

The following information and test data are included in this report.

- 1.) Concrete Mix Proportions
- 2.) Physical Properties Test Data
- 3.) Compressive Strength Test Data
- 4.) Internal Concrete Temperatures
- 5.) Time of Setting Data

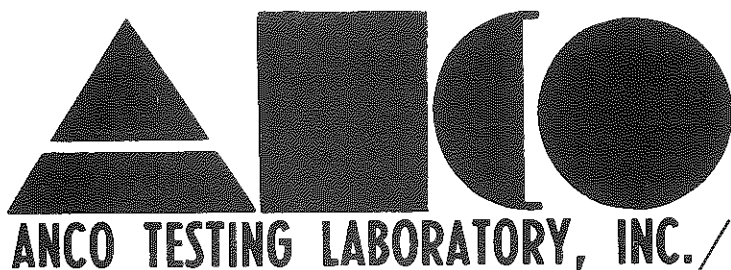
Time of setting data was recorded during tests conducted on specimens prepared and tested in accordance with requirements recorded in ASTM Designation C403-70.

Should there be any questions regarding our report, please advise.

Respectfully submitted,

John T. Anderson
ANCO TESTING LABORATORY, INC.

JTA:de
12-H & O Sales



1552 SOUTH 7TH, ST. LOUIS, MISSOURI 63104
707 E. McCARTY ST., JEFFERSON CITY, MISSOURI

• 314-241-0525
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Report No. A-91187

Page No. 1

GLA-ZIT ADDITIVE EVALUATION TEST DATA

Concrete Mix Proportions - Pounds per Cubic Yard - Scale Weight Basis*

<u>Mix Identification</u>	<u>Gla-Zit</u>	<u>Reference</u>	<u>Gla-Zit/Retarder</u>
Universal Atlas Cement	588	588	588
Bussen "Koch" Limestone Sand	1133	1123	1153
Bussen "Koch" - 3/4" Limestone	1825	1795	1841
Water	349	359	331
AEA - Solar	3.5 oz.	4.0 oz.	2.5 oz.
Gla-Zit Additive	16.0 oz.	- -	16.0 oz.
Water Reducer-Retarder	- -	- -	25.0 oz.

*Saturated, Surface-Dry Weights adjusted to compensate for absorption by the aggregates.

Concrete Temperature - °F	89	88	89
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Concrete Mix Physical Properties Test Data

Slump - Inches	4	4	4
Air Content - Percent	4.0	4.2	4.0
Weight per Cubic Foot - Pounds	143.9	142.8	145.1
Physical Yield - Cubic Feet	27.1	27.1	27.0
Air Temperature - °F	70	70	70
Concrete Temperature - °F*	89 to 96	88 to 96	86 to 95

*A Soil Test Concrete Temperature Meter - Model CT-615 used to record the internal temperature of the concrete.

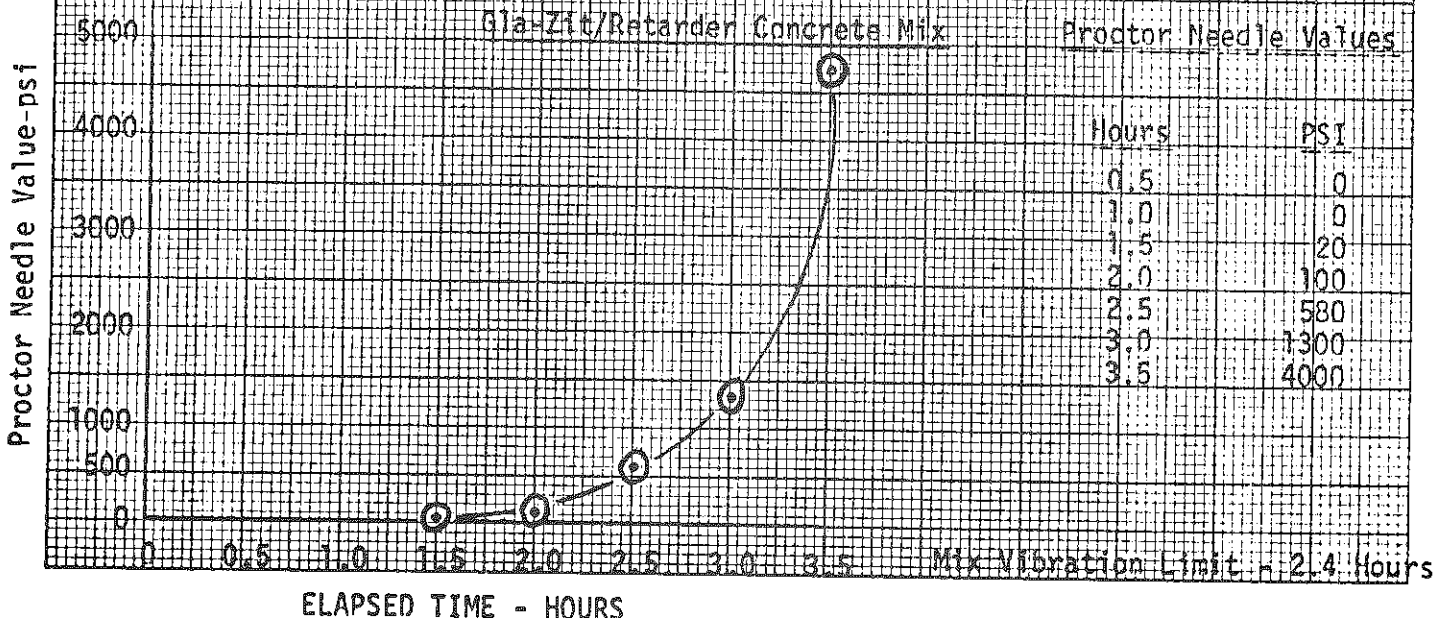
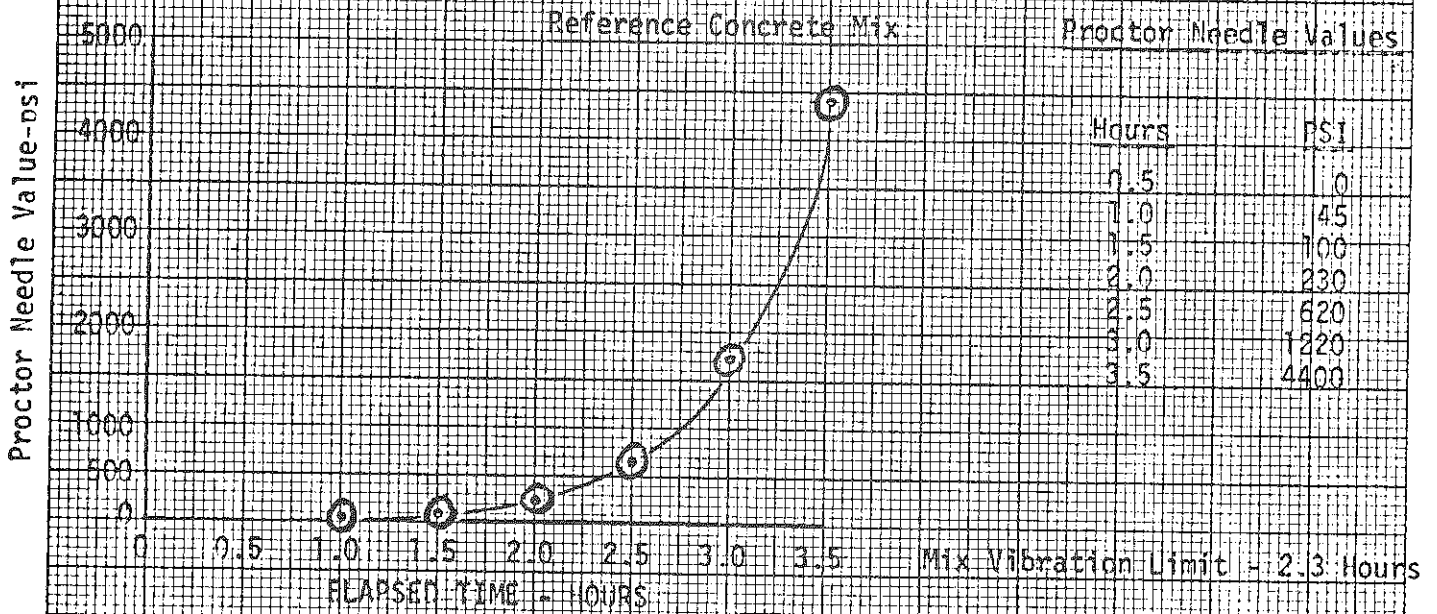
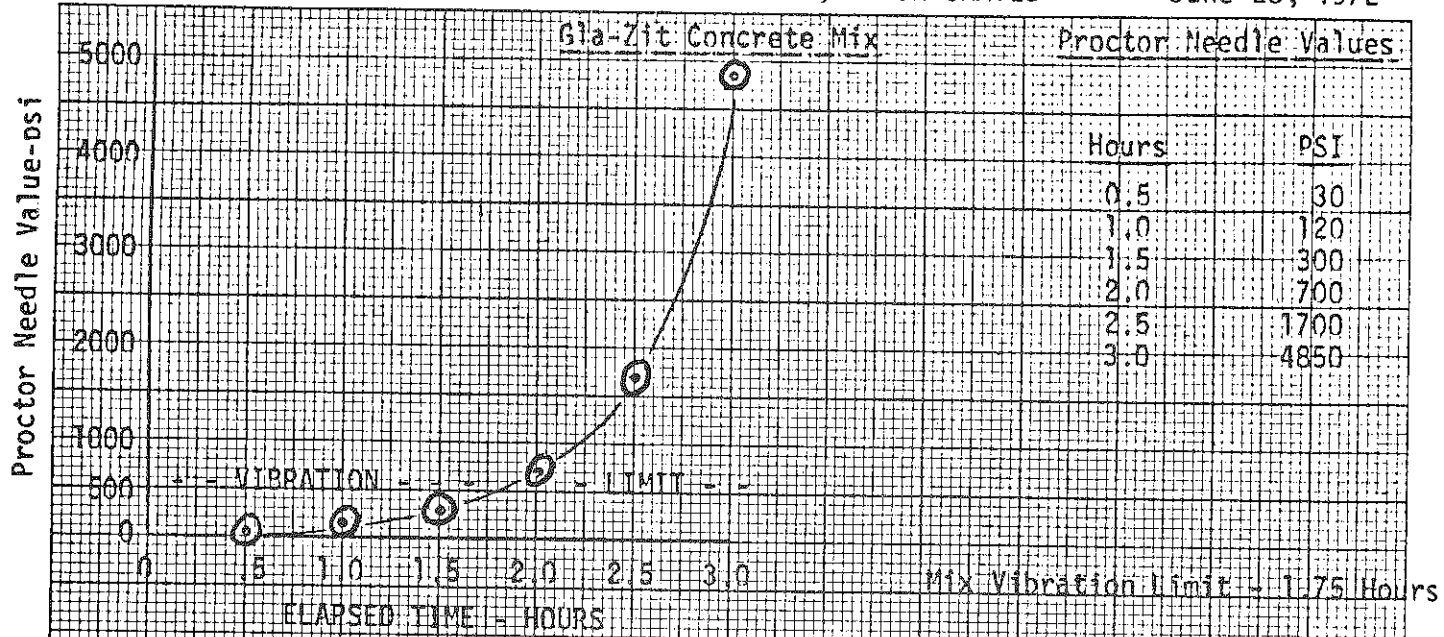
Compressive Strength Test Data

Age at Test - Seven (7) Days

Test No. 1	3006	2759	3077
Test No. 2	3077	2918	3254
Test No. 3	3148	2829	3183
Average	3077	2835	3171

Age at Test - Twenty-Eight (28) Days

Test No. 4	4527	4138	4669
Test No. 5	4457	4280	4616
Test No. 6	4616	4333	4740
Average	4533	4250	4675



TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.



ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114



REPORT OF: TEST OF MASONRY WATERPROOFING PRODUCT

PROJECT: TIME OF SET
 REPORTED TO: H & O Sales Company
 271 Wilson Avenue Southwest
 Cedar Rapids, Iowa 52404
 Attention: Mr. O. M. Rogness

DATE: July 17, 1967

FURNISHED BY:

COPIES TO:

LABORATORY No. 6-2886

GENERAL:

A sample of Gla-Zit waterproofing product was submitted to the laboratory and tests were conducted to determine the reduction in time of set which results when using the solution as an accelerator in concrete mortar.

SAMPLE IDENTIFICATION:

One gallon, Gla-Zit waterproofing product, manufactured by the Cle-Vac Company, Iowa Falls, Iowa. The sample was submitted to the laboratory by the H & O Sales Company, Cedar Rapids, Iowa.

TEST METHOD:

Tests were conducted in accordance with the ASTM Designation C403-63T, "Time of Setting of Concrete Mixtures by Penetration Resistance". The setting time of a mortar which was made using one part of Gla-Zit to twelve parts of water was determined and a comparative determination was made on a mortar which was made without the Gla-Zit admixture.

TEST RESULTS:

<u>Mortar Type</u>	<u>Initial Set</u>	<u>Final Set</u>
Portland cement mortar, with Gla-Zit admixture	2 hrs. 45 min.	5 hrs. 15 min.
Portland cement mortar, without Gla-Zit admixture	4 hrs. 30 min.	6 hrs. 45 min.

REMARKS:

The above test results indicate a definite reduction in the time of set of Portland cement mortar when using the Gla-Zit admixture.

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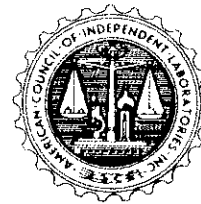
Twin City Testing and Engineering Laboratory, Inc.

By Theodore Johnson



ANCO TESTING LABORATORY, INC.

Report No. A-107883



1552 SOUTH 7TH, ST. LOUIS, MISSOURI 63104
707 E. McCARTY ST., JEFFERSON CITY, MISSOURI

• 314-241-0525
• 314-635-5012

March 7, 1974

Project: Cold Weather Grout Test Program

H & O Sales Company
271 Wilson Avenue S.W.
Cedar Rapids, Iowa 52404

Gentlemen:


In accordance with your instructions, we conducted comparative tests to determine the effect of Gla-Zit admixture on the compressive strength and setting time characteristics of various grout mixtures.

The materials and test specimen molds used in the test program were conditioned to simulate "on site" batching and placing operations during cold weather. Please be advised that we established the 28° F. ambient temperature on the premise that little or no grouting would be attempted at lower temperatures.

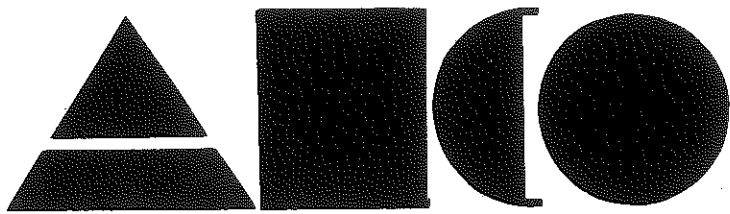
Attached to and made a part of this report are the grout mix proportions, compressive strength test results and setting time characteristics.

Should there be any questions regarding our report, or if we may be of further service, please advise.

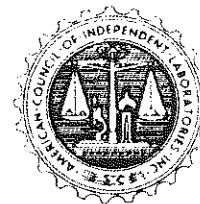
Respectfully submitted,


John T. Anderson
ANCO TESTING LABORATORY, INC.

JTA:ek
9-H & O Sales
3-Bean



ANCO TESTING LABORATORY, INC.



1552 SOUTH 7TH, ST. LOUIS, MISSOURI 63104
707 E. McCARTY ST., JEFFERSON CITY, MISSOURI

314-241-0525
314-635-5012

Report No. A-107883
Page No. 1

COLD WEATHER PRE-CAST UNIT GROUT DATA

<u>Type of Mix</u>	<u>Sand/Cement</u>		<u>Sand/Cement</u>		<u>5 Star Grout</u>	
	<u>1</u>	<u>1A</u>	<u>2</u>	<u>2A</u>	<u>5S</u>	<u>5S-A</u>
<u>Mix Number</u>						
<u>Date Cast</u>	<u>12-5-73</u>	<u>12-5-73</u>	<u>12-17-73</u>	<u>12-17-73</u>	<u>12-13-73</u>	<u>12-13-73</u>
<u>Mix Prop.</u>	<u>1 to 2</u>	<u>1 to 2</u>	<u>1 to 3</u>	<u>1 to 3</u>	<u>1</u>	<u>1</u>
Cement - Lbs.	94	94	94	94	100	100
Sand - Lbs.	172	172	258	258	- -	- -
Water - Gallons*	4.7	4.5	5.8	5.5	2.2	1.9
Gla-zit - Fl.oz.	None	3.0	None	3.0	None	3.0
Temperature	68°F.	67°F.	63°F.	64°F.	78°F.	74°F.

*Includes free moisture in the materials.

Consistency of mixture - Plastic

Additional Temperature Data

Materials at 28°F.

Water at 120°F.

Molds at 28°F.

Compressive Strength Test Data - Average of 3 tests except as noted.

<u>Mix No.</u>	<u>Temp.</u>	<u>1</u>	<u>1A</u>	<u>2</u>	<u>2A</u>	<u>5S</u>	<u>5SA</u>
8 Hours	28°F.	- - -	- - -	- - -	- - -	58	142
24 Hours	28°F.	175	517	100	333	150	510
24 Hours	(See Note 1)	- - -	- - -	- - -	- - -	2950	3900*
48 Hours	28°F.	1258	2233	1016	1842	1208	2250
72 Hours	28°F.	2567	3500	1150	2516	2058	3458
144 Hours	(See Note 2)	6883	8033	- - -	- - -	4417	7017
96 Hours	(See Note 3)	- - -	- - -	2875	5325	- - -	- - -
14 Days	28°F.	- - -	- - -	2167	5825	- - -	- - -

Note 1.) Eight (8) hour specimen remolded and cured for 15 hours at 68°F. The (8) hour specimens returned to plastic consistency at 68°F. one after test.

Note 2.) Specimens cured for 72 hours at 28°F. and 72 hours at 68°F.

Note 3.) Specimens cured for 72 hours at 28°F. and 24 hours at 68°F.

*Single specimen tested.

Setting Characteristics at 28°F.

Mixes 1, 1A, 2, and 2A between 13 and 14 hours.

Mix 5S - 3 1/2 hours and Mix 5SA - 3 hours.

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.



ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114



REPORT OF: TEST OF MASONRY WATERPROOFING PRODUCT

PROJECT: MORTAR PROPERTIES

DATE: July 3, 1968

REPORTED TO: H and O Sales Company
271 Wilson Avenue Southwest
Cedar Rapids, Iowa 52404
Attn: Mr. O.M. Rogness

FURNISHED BY:

COPIES TO:

LABORATORY No. 6-3865

GENERAL:

A sample of Gla-Zit waterproofing product was submitted to the laboratory and tests were conducted to determine the properties of masonry mortar. A 1:3 mix by volume using Type I Portland Cement and masonry sand was compared with and without the Gla-Zit admixture.

SAMPLE IDENTIFICATION:

One gallon, Gla-Zit waterproofing product, manufactured by the Cle-Vac Company, Iowa Falls, Iowa. The sample was submitted to the laboratory by the H and O Sales Company, Cedar Rapids, Iowa.

TEST METHOD:

Tests were conducted in accordance with ASTM Designation C91, "Specification for Masonry Cement". Mortar specimens were made with one part Type I Portland Cement to three parts masonry sand, using one part of Gla-Zit to twelve parts of water. Control specimens were made of the same mix using water without the Gla-Zit admixture. Tests were then conducted to determine the water retention and compressive strength.

TEST RESULTS:

	<u>Mortar Without Gla-Zit Admixture</u>	<u>Mortar With Gla-Zit Admixture</u>
Amount of Mixing Water (%)	10.5	10.5
Flow (%)	115	116
Water Retention (%)	54.8	56.1
Compressive Strength (Ave. of three 2" cubes)		
3 days (psi)	4430	5880 + 33%
7 days (psi)	6480	7380 14%
28 days (psi)	8180	8910 9%

REMARKS:

Based on the above tests, a Portland Cement: sand mortar develops a higher compressive strength with the Gla-Zit admixture, particularly at an early age.

Twin City Testing and Engineering Laboratory, Inc.

By Theodore Johnson

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.

ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

REPORT OF: TEST OF MASONRY WATERPROOFING PRODUCT

PROJECT: ACID RESISTANCE TEST
 REPORTED TO: H and O Sales Company
 271 Wilson Avenue Southwest
 Cedar Rapids, Iowa 52402
 Attn: Mr. O. M. Rogness

DATE: July 9, 1968

FURNISHED BY:

COPIES TO:

LABORATORY No. 6-3865

GENERAL:

A sample of Gla-Zit waterproofing product was submitted to the laboratory and tests were conducted to determine the affect of acid reagents on concrete containing Gla-Zit admixture.

SAMPLE IDENTIFICATION:

One gallon, Gla-Zit waterproofing product, manufactured by the Cle-Vac Company, Iowa Falls, Iowa. The sample was submitted to the laboratory by the H and O Sales Company, Cedar Rapids, Iowa.

TEST METHOD:

Two concrete mixes were proportioned using Type I Portland cement, sand, 3/4 in. gravel and water. One mix was made containing one pint per cubic yard Gla-Zit admixture. Specimens were cast from each concrete mix and after 28 days moist curing were subjected to the attack of five common acids. This test was conducted by completely immersing the test specimens in the acids for a period of 7 days. At the conclusion of the immersion period, the samples were washed and dried and the weight loss was determined.

TEST RESULTS:

Concrete Mix	Regular Concrete Without Gla-Zit	Regular Concrete With Gla-Zit Admixture
Observations After 7 Days Exposure		
Weight loss after 7 days		
20% acetic acid	23.7	15.3
20% formic acid	21.7	21.2
20% citric acid	4.7	3.9
5% sulfuric acid	11.1	10.7
5% hydrochloric acid	4.0	3.9

REMARKS

The above tests indicate that the concrete containing the Gla-Zit admixture has a greater resistance to acid attack.

The reagents used and their concentrations were selected to represent heavy concentrations of various exposures

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Twin City Testing and Engineering Laboratory, Inc.

By Theodore Johnson

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.

ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

REPORT OF: TEST OF MASONRY WATERPROOFING PRODUCT



PROJECT: ACID RESISTANCE

DATE: July 17, 1967

REPORTED TO: H & O Sales Company
271 Wilson Avenue Southwest
Cedar Rapids, Iowa 52404
Attention: Mr. O. M. Rogness

FURNISHED BY:

COPIES TO:

LABORATORY No. 6-2886

GENERAL:

A sample of Gla-Zit waterproofing product was submitted to the laboratory and tests were conducted to determine the effect of acid reagents on sections of concrete coated with the Gla-Zit compound.

SAMPLE IDENTIFICATION:

One gallon, Gla-Zit waterproofing product, manufactured by the Cle-Vac Company, Iowa Falls, Iowa. The sample was submitted to the laboratory by the H & O Sales Company, Cedar Rapids, Iowa.

TEST METHOD:

One part Gla-Zit to eight parts of water were mixed with Portland cement to a thin paste as directed in manufacturer's literature. The mixed solution was then painted on concrete test panels approximately four inches square and one inch in thickness. The test reagents were then placed directly on the coated panel and covered with a watch glass for a period of seven days.

Reagent Number 1 -	Concentrated Citric Acid
Reagent Number 2 -	Concentrated Acetic Acid
Reagent Number 3 -	Concentrated Formic Acid
Reagent Number 4 -	Sulfuric Acid, 50% solution
Reagent Number 5 -	Hydrochloric Acid, 50% solution

TEST RESULTS:

<u>Reagent Used</u>	<u>Test Results</u>
Concentrated Citric Acid	White stain, no blistering, cracking, or other type of deterioration.
Concentrated Acetic Acid	Some blistering occurred to this test specimen, resulting in some bond separation of the applied coating to the concrete panel.

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.

ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

REPORT OF: TEST OF MASONRY WATERPROOFING PRODUCT



DATE: July 17, 1967

PAGE: 2

LABORATORY No. 6-2886

TEST RESULTS: (Continued)

Reagent Used

Test Results

Concentrated
Formic Acid

Some staining, and deterioration of the waterproofing coating occurred in the circular area directly in contact with the edges of the watch glass cover. No blistering or cracking occurred to the waterproofing coating on this test specimen.

Sulfuric Acid,
50% solution

White stain. Some deterioration of the waterproofing coating and concrete panel occurred in the circular area directly in contact with the watch glass cover. No cracking or blistering occurred to this test specimen.

Hydrochloric Acid,
50% solution

Dark brown staining. Deterioration of the waterproofing coating and concrete panel occurred to the test area directly in contact with the outer edges of the watch glass cover. No blistering, cracking, or separation of bond occurred to this test specimen.

REMARKS:

As noted above, the effect of concentrated solutions of Citric Acid, Acetic Acid, and Formic Acid on the waterproofing coating was slight; while the effect of 50% solutions of Sulfuric Acid and Hydrochloric Acid was somewhat more extensive. The deterioration which resulted from these reagents was a gradual process with no major effect noted during the first 24 hours of test.

Note that the concentrations of the reagents used in the above tests are much greater than those which would ordinarily be encountered with normal usage. The stronger concentrations were chosen for the laboratory tests since the time duration of exposure to the reagent is necessarily limited. The deterioration observed on the test specimens would not be considered serious when consideration is given to the high acid concentrations.

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Twin City Testing and Engineering Laboratory, Inc.

By Theodore C. Johnson

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.

ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

REPORT OF: TEST OF CONCRETE ADMIXTURE



PROJECT: CONCRETE COMPRESSIVE STRENGTH
REPORTED TO: H & O Sales Company
271 Wilson Avenue Southwest
Cedar Rapids, Iowa 52404
Attn: O. M. Rogness

DATE: October 23, 1972
FURNISHED BY:
COPIES TO:

LABORATORY No. 6-10841

GENERAL:

A sample of Gla-Zit Ad-Mix was submitted to the laboratory. Tests were conducted to determine the increase in compressive strength gain when using one pint per cubic yard of Gla-Zit in a typical 6.0 sack concrete mix. Also, the strength gain was compared to a 5.5 sack mix with one quart per cubic yard of Gla-Zit.

SAMPLE IDENTIFICATION:

One-half gallon Gla-Zit Ad-Mix concrete admixture manufactured by Gla-Zit, Inc. Iowa Falls, Iowa. The sample was submitted to the laboratory by the H & O Sales Company, Cedar Rapids, Iowa.

METHOD OF TEST:

Standard 6 inches by 12 inches cylinder compression test specimens were cast from the 6 bag-plain mix, 6 bag-pint/yard Gla-Zit mix, and 5.5 bag-quart/yard mix. Six cylinders were cast from each mix in the laboratory and cured in accordance with ASTM Designation C192. These cylinders were then tested at ages of 1, 2 and 3 days in accordance with ASTM Designation C39. The water added in each mix was held constant to determine the effect on the concrete consistency with Gla-Zit added.

TEST DATA AND RESULTS:

Concrete Mix Proportions -			
Type I Portland Cement	564#	564#	517#
#4 down Fine Aggregate	1270#	1270#	1360#
3/4" Gravel Coarse Aggregate	1900#	1900#	1890#
Water	33 gal	33 gal	33 gal
Gla-Zit Ad-Mix	None	1 pint	1 quart

Tests on Plastic Concrete -			
Slump (in.)	3 1/4	3 1/2	2 3/4
Air Content (%)	1.5	1.4	1.7
Wet Unit Weight (pcf)	148.9	149.7	149.0

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.

ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114
TEST OF CONCRETE ADMIXTURE

REPORT OF:



DATE: October 23, 1972
PAGE: Two

LABORATORY No. 6-10841

TEST DATA AND RESULTS: (cont'd)

Compressive Strength -			
1 day strength (psi)			
cylinder 1	1940	2010	1570
cylinder 2	1860	2030	1600
average	1900	2020	1585
2 day strength (psi)			
cylinder 1	2540	2850	2460
cylinder 2	2650	2710	2410
average	2595	2780	2435
3 day strength (psi)			
cylinder 1	3070	3340	2890
cylinder 2	3040	3270	3000
average	3055	3305	2945

REMARKS:

The above tests were conducted in October 1972.

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Twin City Testing and Engineering Laboratory, Inc.
By *Charles Johnson*

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.



ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

REPORT OF: TEST OF CONCRETE AND MASONRY ADMIXTURE



PROJECT: LIGHTWEIGHT INSULATING CONCRETE

DATE: December 19, 1969

REPORTED TO: H & O Sales Company
271 Wilson Avenue Southwest
Cedar Rapids, Iowa 52404
Attn: Mr. O. M. Rogness

FURNISHED BY:

COPIES TO:

LABORATORY No. 6-6422

GENERAL:

A sample of Gla-Zit concrete and masonry admixture was submitted to the laboratory and tests were conducted to determine the improved curing given to lightweight insulating concrete when exposed to freezing conditions with the addition of Gla-Zit admixture.

SAMPLE IDENTIFICATION:

One-half gallon, Gla-Zit admixture product, manufactured by the Cle-Vac Company, Iowa Falls, Iowa. The sample was submitted to the laboratory by the H & O Sales Company, Cedar Rapids, Iowa.

TEST PROGRAM:

This program includes Vermiculite stabilized concrete aggregate insulating concrete mixes with and without Gla-Zit to evaluate each phase. All mixes are 1:4, Portland cement to Vermiculite aggregate mixed with 3 gallons of water per cubic foot of aggregate. Mixes with Gla-Zit include 1 pint per cubic yard.

A control mix was cast at standard laboratory conditions, cured and tested in accordance with ASTM Designation C495-68 "Compressive Strength of Lightweight Insulating Concrete". Density and compressive strength tests were conducted on 3 in. diameter by 6 in. cylinders.

Cold water mixes included water at 73 F and mixed at standard laboratory conditions. Hot water mixes included water at 120 F and also mixed at standard laboratory conditions. Cylinders were cast from these mixes both with and without Gla-Zit and immediately placed in the following test conditions: 40 F, 32 F, 25 F and 15 F. All test cylinders from these mixes were cycled five times between their original temperature condition for 8 hours and 40 F for 16 hours. The cylinders at 40 F condition remained at 40 F for this entire 5 day period. All cylinders were then cured and tested in accordance with ASTM Designation C495-68, the same as for the control mixes.

Three cylinders were cast for each condition (control, with and without Gla-Zit, cold and hot water, and four temperature conditions) and tested to determine dry density and compressive strength.

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.

ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

REPORT OF: TEST OF CONCRETE AND MASONRY ADMIXTURE



DATE: December 19, 1969

PAGE: 2

LABORATORY No. 6-6422

TEST DATA AND RESULTS:

Control Mix - Sample Number	1	2	3	Average
Dry Density (pcf)	33.5	33.3	33.6	33.5
Compressive Strength (psi)	330	330	310	325

Cold Water Mix (73 F) -

Sample Number	With Gla-Zit Admixture				Without Gla-Zit Admixture			
	1	2	3	Ave.	4	5	6	Ave.
Dry Density (psi) from condition								
@ 40 F	31.4	31.0	31.5	31.3	29.8	29.4	29.4	29.5
@ 32 F	31.5	31.2	31.4	31.4	29.7	29.4	29.4	29.5
@ 25 F	31.0	31.1	31.4	31.3	29.6	29.8	29.9	29.8
@ 15 F	31.1	31.4	31.0	31.3	29.6	29.0	29.8	29.5

Compressive Strength (psi) from condition

@ 40 F	250	250	270	255	240	180	170	195
@ 32 F	250	260	290	265	230	230	200	220
@ 25 F	190	240	230	220	160	210	150	175
@ 15 F	180	200	240	205	170	170	140	160

Hot Water Mix (120 F) -

Sample Number	With Gla-Zit Admixture				Without Gla-Zit Admixture			
	7	8	9	Ave.	10	11	12	Ave.
Dry Density (psi) from condition								
@ 40 F	32.2	32.0	32.4	32.2	32.0	31.5	32.0	31.8
@ 32 F	32.7	31.8	32.1	32.2	31.8	31.8	31.5	31.7
@ 25 F	32.0	32.1	32.1	32.1	32.2	31.8	31.8	31.9
@ 15 F	32.1	31.8	32.4	32.1	31.4	32.0	31.9	31.8

Compressive Strength (psi) from condition

@ 40 F	270	270	300	280	240	220	230	230
@ 32 F	320	300	300	305	230	260	240	245
@ 25 F	240	250	230	240	200	200	180	195
@ 15 F	210	190	230	210	180	190	150	175

TWIN CITY TESTING AND ENGINEERING LABORATORY, INC.

ENGINEERS AND CHEMISTS

662 Cromwell Avenue - St. Paul, Minn. 55114

REPORT OF: TEST OF CONCRETE AND MASONRY ADMIXTURE

DATE: December 19, 1969

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LABORATORY No. 6-6422

REMARKS:

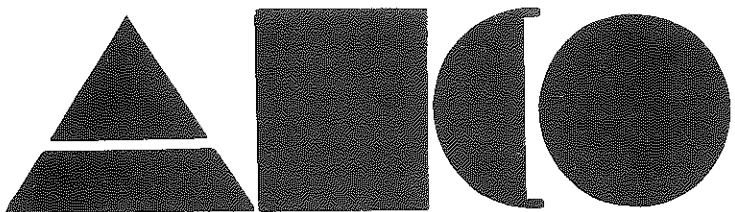
Based on the above tests, the Gla-Zit admixture increases the density slightly and ultimate compressive strength in both cold and hot water mixes. The Gla-Zit admixture used with hot water developed a compressive strength of 94 per cent of the control mix when exposed to 32 F temperatures and 75 per cent of control when exposed to 25 F conditions.

The higher strengths of the samples conditioned at 32 F above those conditioned at 40 F would be expected since a slower cure of Portland cement concrete without freezing develops higher ultimate compressive strength.

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Twin City Testing and Engineering Laboratory, Inc.

BY



Member:

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ANCO TESTING LABORATORY, INC./

1552 SOUTH 7TH, ST. LOUIS, MISSOURI 63104
707 E. McCARTY ST., JEFFERSON CITY, MISSOURI

314-241-0525
314-635-5012

Report No. A-111718

September 5, 1974

H & O Sales Company
271 Wilson Avenue S.W.
Cedar Rapids, Iowa 52404

Project: Concrete Masonry Unit Tests

Gentlemen:

In accordance with your instructions, we conducted Compressive Strength, Moisture and Absorption, and Drying Shrinkage Tests on three (3) sets of eight (8) - two (2) cell - Hollow, Load-Bearing - HEAVYWEIGHT concrete masonry units produced by F. F. Kirchner, Incorporated, St. Louis, Missouri.

Concrete Mix Data for each set of units are noted below.

Mix Identification

K-Mix
G-1 Mix
G-2 Mix

Mix Composition

Kirchner Heavyweight Mix with Complast 90.
Kirchner Heavyweight Mix with 3 Pints Gla-Zit.
Kirchner Heavyweight Mix with 5.5 Pints Gla-Zit.

Methods of Test and/or Procedures

Compression Test
Moisture and Absorption Test
Drying Shrinkage Test

ASTM Designation C140-70
ASTM Designation C140-70
ASTM Designation C426-70

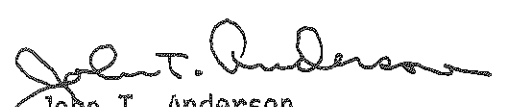
We have attached and made a part of this report results of the tests noted above.

Test results indicate compliance with all requirements for Grades N-I and/or N-II Hollow, Load-Bearing concrete masonry units recorded in ASTM Specification C90-70.

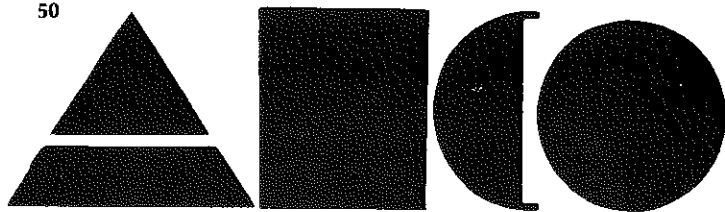
Additional information and Data

- 1.) Units produced from K-Mix concrete were water streaked, while units produced from G-1 and G-2 Mix concrete were not.
- 2.) A heavy coating, similar to efflorescence, built up on the exterior faces of a unit produced from K-Mix concrete during alternate wetting and drying cycle tests. The build up of coating on units produced from G-1 and G-2 Mix concrete was very limited. The units tested were epoxied in a vertical position to a waterproof surface, and the cells were filled with water after the cells had drained. The test was terminated after thirty-five (35) cycles.

Respectfully submitted,


Jong T. Anderson
ANCO TESTING LABORATORY, INC.

JTA:ek
9-H & O
3-bean



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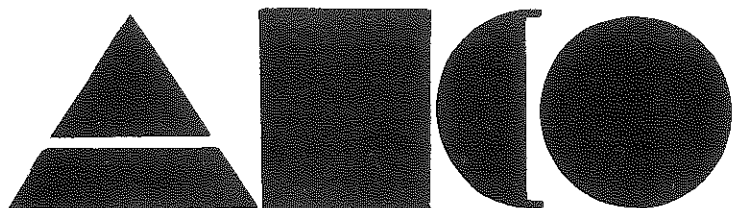
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COMPRESSIVE STRENGTH TEST DATA

<u>K-Mix Units</u>	<u>K-1</u>	<u>K-2</u>	<u>K-3</u>	Average
Dimensions - Inches	- - - - 7 5/8 x 7 5/8 x 15 5/8 - - - -			
Face Shell Thickness - Ins.	1.275	1.277	1.275	1.276
End Web Thickness - Ins.	1.038	1.038	1.038	1.038
Center Web Thickness - Ins.	1.121	1.123	1.121	1.122
End Web Thickness - Ins.	1.050	1.050	1.050	1.050
Web Equivalent Thickness-Ins.	2.465	2.466	2.465	2.465
Weight-Pounds	37.5	37.6	37.5	37.5
Applied Load - Pounds	208,000	193,000	197,000	<i>199,333</i>
Gross Area - Sq.In.	- - - - - 119.14 - - - - -			
Strength - Lbs/Sq.In.	1746	1620	1653	1673
Net Area - Sq.In.	63.14	62.75	63.12	
Strength - Lbs/Sq.In.	3294	3076	3121	3164

<u>G-1 Mix Units</u>	<u>G-1-1</u>	<u>G-1-2</u>	<u>G-1-3</u>	Average
Dimensions - Inches	- - - - - 7 5/8 x 7 5/8 x 15 5/8 - - - -			
Face Shell Thickness-Ins.	1.267	1.267	1.267	1.267
End Web Thickness - Ins.	1.030	1.030	1.030	1.030
Center web Thickness - Ins.	1.130	1.130	1.130	1.130
End Web Thickness - Ins.	1.051	1.051	1.054	1.052
web Equivalent Thickness - Ins.	2.466	2.466	2.468	2.467
Weight - Pounds	37.2	37.2	37.3	37.2
Applied Load - Pounds	222,000	226,000	231,000	<i>226,333 +14%</i>
Gross Area - Sq.In.	- - - - - 119.14 - - - - -			
Strength - Lbs/Sq.In.	1863	1897	1939	1900 <i>+14%</i>
Net Area - Sq. In.	62.41	61.30	62.01	
Strength - Lbs/Sq.In.	3557	3687	3725	3656 <i>+16%</i>

<u>G-2 Mix Units</u>	<u>G-2-1</u>	<u>G-2-2</u>	<u>G-2-3</u>	Average
Dimensions - Inches	- - - - - 7 5/8 x 7 5/8 x 15 5/8 - - - -			
Face Shell Thickness - Ins.	1.275	1.275	1.275	1.275
End web Thickness - Ins.	1.035	1.035	1.035	1.035
Center Web Thickness - Ins.	1.133	1.130	1.131	1.131
End Web Thickness - Ins.	1.049	1.050	1.049	1.049
Web Equivalent Thickness-Ins.	2.471	2.469	2.469	2.470
weight-Pounds	37.5	37.5	37.5	37.5
Applied Load - Pounds	218,000	226,000	231,000	<i>225,000 +13%</i>
Gross Area - Sq.In.	- - - - - 119.14 - - - - -			
Strength - Lbs/Sq.In.	1830	1897	1839	1855 <i>+11%</i>
Net Area - Sq.in.	62.05	62.37	61.69	
Strength - Lbs/Sq.in.	3513	3624	3745	3627 <i>+15%</i>


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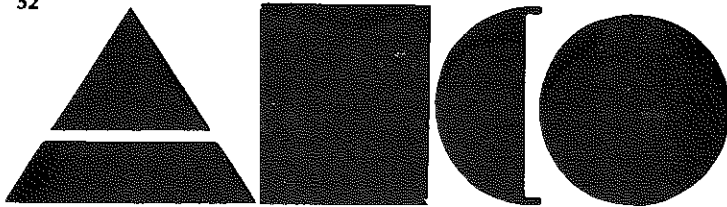
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MOISTURE AND ABSORPTION TEST DATA

<u>K-Mix Units</u>	<u>K-1</u>	<u>K-2</u>	<u>K-3</u>	Average
Dimensions - Inches	- - - - 7 5/8 x 7 5/8 x 15 5/8 - - - -			
Face Shell Thickness - Ins.	1.275	1.275	1.271	1.274
End Web Thickness - Ins.	1.038	1.038	1.036	1.037
Center Web Thickness-Ins.	1.121	1.121	1.121	1.121
End Web Thickness - Ins.	1.050	1.050	1.049	1.049
Web Equivalent Thickness-Ins.	2.465	2.465	2.462	2.464
Weight - Pounds	37.5	37.4	37.2	37.4
Weight/Cubic Foot - Pounds	132.2	132.7	131.2	132.0
Absorption - Percent	6.2	6.7	6.5	6.5
Absorption - Lbs/Cu.Ft.	8.1	8.8	8.5	8.5
Moisture - Percent*	29.5	26.5	28.0	28.0
<u>G-1 Mix Units</u>	<u>G-1-1</u>	<u>G-1-2</u>	<u>G-1-3</u>	Average
Dimensions - Inches	- - - - 7 5/8 x 7 5/8 x 15 5/8 - - - -			
Face Shell Thickness-Ins.	1.267	1.267	1.267	1.267
End Web Thickness - Ins.	1.030	1.030	1.030	1.030
Center Web Thickness - Ins.	1.130	1.130	1.128	1.129
End Web Thickness - Ins.	1.051	1.051	1.050	1.051
Web Equivalent Thickness-Ins.	2.466	2.466	2.464	2.465
Weight - Pounds	37.2	37.2	37.1	37.2
Weight/Cubic Foot - Pounds	133.6	134.4	133.4	133.8
Absorption - Percent	6.5	6.6	6.8	6.6
Absorption - Lbs/Cu.Ft.	8.7	8.7	9.1	8.8
Moisture - Percent*	29.2	27.7	24.0	27.0
<u>G-2 Mix Units</u>	<u>G-2-1</u>	<u>G-2-2</u>	<u>G-2-3</u>	Average
Dimensions - Inches	- - - - 7 5/8 x 7 5/8 x 15 5/8 - - - -			
Face Shell Thickness-Ins.	1.275	1.275	1.273	1.274
End Web Thickness - Ins.	1.035	1.035	1.035	1.035
Center Web Thickness - Ins.	1.133	1.131	1.132	1.132
End Web Thickness - Ins.	1.049	1.049	1.047	1.048
Web Equivalent Thickness-Ins.	2.471	2.469	2.468	2.469
Weight - Pounds	37.5	37.5	37.3	37.4
Weight/Cubic Foot - Pounds	134.6	134.1	134.0	134.2
Absorption - Percent	6.6	8.2	6.5	6.5
Absorption - Lbs/Cu.Ft.	9.0	8.4	8.9	8.8
Moisture - Percent*	26.5	26.1	25.6	26.1

*Expressed as a percent of-total absorption.



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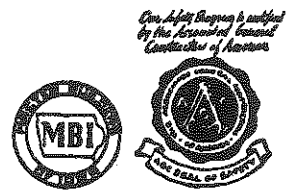
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DRYING SHRINKAGE TEST DATA

<u>K-Mix Units</u>	<u>K-7</u>	<u>K-8</u>	<u>K-9</u>	Average
Dimensions - Inches	- - - - 7 5/8 x 7 5/8 x 15 5/8 - - - -			
Face Shell Thickness - Ins.	1.278	1.275	1.276	1.277
End Web Thickness - Ins.	1.040	1.038	1.040	1.039
Center Web Thickness - Ins.	1.123	1.121	1.123	1.122
End Web Thickness - Ins.	1.052	1.050	1.052	1.051
Web Equivalent Thickness-Ins.	2.469	2.465	2.469	2.468
Weight - Pounds (As Received Basis)	37.7	37.5	37.7	37.6
Weight - Pounds (Saturated, Surface-Dry Basis)	39.2	39.0	39.1	39.1
Lineal Shrinkage - Percent	0.021	0.019	0.017	0.019
<u>G-1 Mix Units</u>	<u>G-1-7</u>	<u>G-1-8</u>	<u>G-1-9</u>	Average
Dimensions - Inches	- - - - 7 5/8 x 7 5/8 x 15 5/8 - - - -			
Face Shell Thickness - Ins.	1.267	1.272	1.275	1.271
End Web Thickness - Ins.	1.030	1.033	1.035	1.033
Center Web Thickness - Ins.	1.130	1.130	1.130	1.130
End Web Thickness - Ins.	1.051	1.052	1.052	1.052
Web Equivalent Thickness-Ins.	2.466	2.469	2.471	2.469
Weight - Pounds (As Received Basis)	37.2	37.5	37.6	37.4
Weight - Pounds (Saturated, Surface-Dry Basis)	38.8	39.2	39.3	39.1
Lineal Shrinkage - Percent	0.022	0.020	0.017	0.020
<u>G-2 Mix Units</u>	<u>G-2-1</u>	<u>G-2-2</u>	<u>G-2-3</u>	Average
Dimensions - Inches	- - - - 7 5/8 x 7 5/8 x 15 5/8 - - - -			
Face Shell Thickness - Ins.	1.267	1.273	1.275	1.272
End Web Thickness - Ins.	1.030	1.035	1.035	1.033
Center Web Thickness - Ins.	1.130	1.132	1.133	1.132
End Web Thickness - Ins.	1.051	1.047	1.049	1.049
Web Equivalent Thickness - Ins.	2.466	2.468	2.471	2.468
Weight - Pounds (As Received Basis)	37.2	37.3	37.5	37.3
Weight - Pounds (Saturated, Surface-Dry Basis)	39.0	39.1	39.4	39.2
Lineal Shrinkage - Percent	0.017	0.018	0.020	0.018

SPENCER CONSTRUCTION CO.
INCORPORATED

BUILDING CONTRACTORS



BOX 590
PH. 712-262-1210
SPENCER, IOWA 51301

November 19, 1976

To Whom It May Concern:

We would like to endorse the use of Glazit for many jobs that we have used it on in various ways; but, specifically, the use on 2 projects where its use was spectacular as follows:

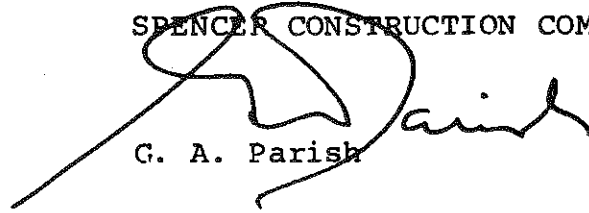
- 1) On a concrete water reservoir at Lake Park, Iowa, the tank was constructed on clay bottom at water table height with a diameter of approximately 60' and 6" reinforced bottom slab. Although strawed down during the winter, frost heaved the slab, cracking it in many places with some cracks 3/8" wide. We investigated epoxies, pouring a slab over the existing cracked slab, or breaking out the entire floor and replacing, which would be difficult since the floor slab was also the footing for the reservoir walls. We were able to get the engineer's permission to try Glazit if we would produce a 10 year warranty bond. We patched the cracks with a Glazit mortar, and then 2 coats of Glazit slurry brushed on. The total cost was very low compared to the alternatives, and there has been no problem of leaking 8 years later.
- 2) In the construction of a sewage treatment plant at Emmetsburg, Iowa, we had a pump pit and dry section of basement floor approximately 40' x 100' that ranged from 6' to 20' below water table. The engineer had shown an elaborate water vapor barrier and a 2" concrete mud sill. Since this was on sand and a great deal of steel reinforcing in footings, sill beams, etc. would have made waterproofing in such a manner almost impossible, we received permission to eliminate the water seal and use glazit in the concrete. We used 4 oz. per bag added on the job and poured all of the base slabs and walls. Since the water table was so high, we had to complete the building before cutting off pumping because of floatability. It was several months later before we could see the results of our substitution. After cutting pumps and letting the water raise, we did not have a single leak.

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We are most satisfied with our use of Glazit, and it has not failed us yet. Hopefully, its use will become more readily approvable as far as engineers and architects are concerned.

Respectfully,

SPENCER CONSTRUCTION COMPANY

A handwritten signature in black ink, appearing to read "G. A. Parish". The signature is written in a cursive style with a large, looping initial "G".

G. A. Parish

GAP/js