















































SECTION 04300 - PRECAST ARCHITECTURAL CONCRETE

SCOPE

Include all materials and labor and incidentals for the cleaning and repair of existing precast concrete...

PART 1 - GENERAL

SCOPE
SUBMITTALS
QUALITY ASSURANCE

PART 2 - PRODUCTS

ARCHITECTURAL PRECAST CONCRETE MATERIALS
MORTAR MATERIALS
MANUFACTURED REPAIR MATERIALS

PART 3 - EXECUTION

REMOVAL AND REPLACEMENT
REPORTING EXISTING WORK
CLEANING EXISTING ARCHITECTURAL PRECAST CONCRETE

SCOPE

Clean and repair of existing architectural precast concrete by removal and replacement as necessary.

SUBMITTALS

Supply product data for each type of architectural precast concrete on the building.

QUALITY ASSURANCE

Show restoration craftsmen are to be from an experienced stone restoration firm.

PART 2 - PRODUCTS

ARCHITECTURAL PRECAST CONCRETE MATERIALS
MORTAR MATERIALS
MANUFACTURED REPAIR MATERIALS

PART 3 - EXECUTION

REMOVAL AND REPLACEMENT
REPORTING EXISTING WORK
CLEANING EXISTING ARCHITECTURAL PRECAST CONCRETE

REMOVAL AND REPLACEMENT

Remove architectural precast concrete that has deteriorated or is damaged beyond repair.

REPORTING EXISTING WORK

Remove mortar to a depth of 1/2" or more using tools that do not damage adjacent materials.

CLEANING EXISTING ARCHITECTURAL PRECAST CONCRETE

Wet stone with cold water applied by low pressure spray.

SECTION 04310 - CLAY WALL COATING

PART 1 - GENERAL

FURNISH all labor, materials, tools and equipment to perform all work necessary and incidental to providing and installing new clay wall coating...

PART 2 - PRODUCTS

Clay wall coating shall be the product of an approved specialty plant.

PART 3 - EXECUTION

Wet clay wall coating shall be free of frost, oil, grease, dirt, wax, grease, oil, or other impurities.

PART 3 - EXECUTION

Wet clay wall coating shall be free of frost, oil, grease, dirt, wax, grease, oil, or other impurities.

SECTION 04310 MAINTENANCE OF STONE ASSEMBLIES

SCOPE

Include all materials and labor and incidentals for the cleaning and repair of existing stone assemblies.

PART 1 - GENERAL

SCOPE
SUBMITTALS
QUALITY ASSURANCE

PART 2 - PRODUCTS

STONE MATERIALS
MORTAR MATERIALS
MANUFACTURED REPAIR MATERIALS

PART 3 - EXECUTION

REMOVAL AND REPLACEMENT
REPORTING EXISTING WORK
CLEANING EXISTING STONEWORK

SCOPE

Clean and repair of existing stone by removal and replacement as necessary.

SUBMITTALS

Supply product data for each type of stone in the building.

QUALITY ASSURANCE

Stone restoration craftsmen are to be from an experienced stone restoration firm.

PART 2 - PRODUCTS

STONE MATERIALS
MORTAR MATERIALS
MANUFACTURED REPAIR MATERIALS

PART 3 - EXECUTION

REMOVAL AND REPLACEMENT
REPORTING EXISTING WORK
CLEANING EXISTING STONEWORK

REMOVAL AND REPLACEMENT

Remove stone that has deteriorated or is damaged beyond repair.

REPORTING EXISTING WORK

Remove mortar to a depth of 1/2" or more using tools that do not damage adjacent materials.

CLEANING EXISTING STONEWORK

Wet stone with cold water applied by low pressure spray.

SECTION 04313 BRICK MASONRY

SCOPE

The work includes in this section that include everything necessary for and incidental to the execution and completion of all work specified herein.

PART 1 - GENERAL

SCOPE SUMMARY
QUALITY ASSURANCE

PART 2 - PRODUCTS

STONE MATERIALS
MORTAR MATERIALS
MANUFACTURED REPAIR MATERIALS

PART 3 - EXECUTION

REMOVAL AND REPLACEMENT
REPORTING EXISTING WORK
CLEANING EXISTING STONEWORK

SCOPE SUMMARY

Remove and replace existing brick masonry units and mortar joints as necessary.

QUALITY ASSURANCE

Restoration Specialist Qualifications. Engage experienced masonry restoration firm with 10 or more years of experience.

PART 2 - PRODUCTS

STONE MATERIALS
MORTAR MATERIALS
MANUFACTURED REPAIR MATERIALS

PART 3 - EXECUTION

REMOVAL AND REPLACEMENT
REPORTING EXISTING WORK
CLEANING EXISTING STONEWORK

REMOVAL AND REPLACEMENT

Remove brick that has deteriorated or is damaged beyond repair.

REPORTING EXISTING WORK

Remove mortar to a depth of 1/2" or more using tools that do not damage adjacent materials.

CLEANING EXISTING STONEWORK

Wet stone with cold water applied by low pressure spray.

PART 3 - EXECUTION

SUBSTRATE PREPARATION

Exterior masonry surfaces shall be inspected for cracks and or defective mortar joints and for missing brick.

PART 2 - PRODUCTS

STONE MATERIALS
MORTAR MATERIALS
MANUFACTURED REPAIR MATERIALS

PART 3 - EXECUTION

REMOVAL AND REPLACEMENT
REPORTING EXISTING WORK
CLEANING EXISTING STONEWORK

SCOPE SUMMARY

Remove and replace existing brick masonry units and mortar joints as necessary.

QUALITY ASSURANCE

Restoration Specialist Qualifications. Engage experienced masonry restoration firm with 10 or more years of experience.

PART 2 - PRODUCTS

STONE MATERIALS
MORTAR MATERIALS
MANUFACTURED REPAIR MATERIALS

PART 3 - EXECUTION

REMOVAL AND REPLACEMENT
REPORTING EXISTING WORK
CLEANING EXISTING STONEWORK

REMOVAL AND REPLACEMENT

Remove brick that has deteriorated or is damaged beyond repair.

REPORTING EXISTING WORK

Remove mortar to a depth of 1/2" or more using tools that do not damage adjacent materials.

CLEANING EXISTING STONEWORK

Wet stone with cold water applied by low pressure spray.

GENERAL SHEET NOTES

A. REMOVE ALL GRAFFITI PER SPECIFICATIONS

B. SEE ASA 01 FOR REMOVAL OF CMU & BRICK WINDOW NFLL

REPAIR KEY NOTES

TUCKPOINTING

BRICK REPLACEMENT

REPLACE OR REHABILITATE STILL/BELT COURSE

REPLACE CLAY CAP WHERE BROKEN OR MISSING

REPLACE OR REPAIR INDIVIDUAL DAMAGED BRICKS OR JOINTS PER SPECIFICATIONS

TUCKPOINTING

REPAIR KEY NOTES

TUCKPOINTING

BRICK REPLACEMENT

REPLACE OR REHABILITATE STILL/BELT COURSE

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TUCKPOINTING

TUCKPOINTING

GARVER FEEDMILL REDEVELOPMENT PLAN

3241 GARVER GREEN MADISON, WI 53704

Owner: GARVER FEED MILL LLC 1830 W. Chicago Avenue Ste. 200 Chicago, IL 60642

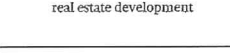


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SCHMITT TECHNICAL SERVICES REPORT



January 9, 2013

Mr. Peter Anderson  
14010 Elm Street  
101 Dunsmuir Road  
Madison, WI 53714

RE: Laboratory Analysis of Brick and Mortar - Garver Feed Mill Evaluation Project - Madison, WI

Dear Mr. Anderson:

Schmitt Technical Services, Inc. (STSI) has completed laboratory testing to evaluate condition, composition and quality of samples taken from clay brick and masonry mortar as part of an evaluation and repair of existing structures at the Garver Feed Mill, Madison, WI. The Garver Feed Mill building was reported to be constructed in 1955-1956. The samples were received at STSI on December 12, 2012. Sample identifications are provided in Table 1.

Table 1. Sample Identifications, Descriptions and Test Performed

The following analysis was performed:

- (a) Petrographic and chemical analysis on the masonry mortar to determine the cementitious content and masonry type per ASTM C1024 test.
- (b) Conducted physical testing (absorption, compressive strength and saturation coefficient) according to ASTM C 672 on brick samples.

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Analysis of Masonry Mortar and Clay Brick  
Garver Feed Mill, Madison, WI  
STSI Project No. 12098  
January 9, 2013

- 1) ASTM C 672 states the variation coefficient shall not exceed 0.76 for an average of 3 bricks and 0.90 for an individual brick. Three of the bricks exceed the maximum variation coefficient for individual brick. The average of five bricks exceeds the 0.75 requirement.

- 1) Based on the testing and analysis performed, condition and quality of the masonry is variable depending on location. In some areas, the present quality is poor. In other areas, the condition and quality is marginal. Additional brick testing should be done to further determine acceptable from available areas. It should be noted that none of the existing brick masonry is equivalent to the quality and long-term better maintenance of new masonry.

Additional details of the petrographic examination are provided later in this report.

LABORATORY PROCEDURES

Chemical Analysis

Chemical analysis of the mortar was performed per ASTM C 154 - Standard Test Method for Examination and Analysis of Hardened Masonry Mortar. Determination of calcium oxide level was performed using ASTM C 114 - Standard Test Method for Chemical Analysis of Hydraulic Cement Section 9 - Ammonium Hydroxide and Section 13 - Calcium Oxide.

Petrographic Analysis

The mortar was examined using techniques and procedures outlined in ASTM C 1321 - Standard Test Method for Examination and Analysis of Hardened Masonry Mortar and ASTM C 496 - Standard Practice for Petrographic Examination of Hardened Concrete and the Federal Highway Administration's Publication No. FHWA/HRT-04-135 - Petrographic Methods of Identifying Hardened Concrete - Petrographic Manual.

The mortar examination included using the sample lengthwise followed by splitting one half of the sawed disc with successive finer lapping cuts to produce a finely ground and nearly polished surface of the entire mortar thickness. The lapped surface and freshly broken surfaces of the specimen were examined visually, with the unaged eyes and under a stereomicroscope at magnifications of 7x to 40x.

In addition, a thin section was made from the mortar. In some areas, crushed fragments of the "products of cementitious" reaction. The thin section and micrograph results were examined under plane and cross-polarized light at magnifications of 90x to 400x using a polarizing light microscope.

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Figure 1. Moisture sample '901AS1' received in the laboratory for testing. Top view shows two cylindrical samples in a clear container.



Figure 2. Moisture sample '901AS1' received in the laboratory for testing. Side view shows two cylindrical samples in a clear container.

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FINDINGS AND CONCLUSIONS

Spectrometric analysis of the mortar samples reveals a high calcium oxide level and a high level of silica.

- 1) The mortar was analyzed for calcium oxide, available moisture and loss on ignition (LOI) at 105°C, 250°C, and 400°C. From this data, composition content of the historical sample was calculated. Results are summarized in Table 2 below:

Table 2. Chemical Analysis Results for Garver Feed Mill Masonry Mortar (ASTM C 154)

Note: (1) Values are calculated based on loss on ignition percentages, using a loose bulk density of 94 pcf for Portland Cement (PC), 80 pcf for hydrated lime and 90 pcf for sand.

- 2) Thus, the chemical analysis determined the Portland cement hydrated fines aggregate ratio of the masonry mortar to be:

Mortar Sample  
Hydrated Fines (Portland Cement + Aggregate) to Volume of Aggregate = 0.66:0.34

- 3) Petrographic examination reveals the masonry mortar to be composed of a mixture of coarse sand and siliceous, optimally sorted and dispersed, natural sand aggregate (Figure 3) embedded in a highly cemented Portland cement paste matrix (Figure 4). Measured maximum aggregate size is 4.75 mm (0.19 in) passing the No. 41.8 standard mesh sieve (ASTM C 119) and is coarse. Most of the aggregate is finer than 0.075 mm (No. 200) sieve (Figure 5). Thus, the aggregate is close to the gradation required for high strength concrete (Figure 6). Thus, the aggregate is close to the gradation required for high strength concrete (Figure 6).

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Exposure to water development tests were done using techniques outlined in ASTM C 1190 - Standard Test Method for Water Absorption, Water Saturation Coefficient, and Moisture Content of Brick and Mortar by the Dry Immersion Method.

Physical Testing of Clay Brick

Absorption, compressive strength, initial rate of absorption (suction) and saturation coefficient of the clay brick were determined using methods outlined in ASTM C 672 - Standard Test Method for Sampling and Testing Brick and Structural Clay Tile.

PETROGRAPHIC EXAMINATION

Mortar Matrix

General Description

The sample consists of two (2) mortar fragments identified as "01AS1" (Figure 1 and 2). The fragment has dimensions of 2.14 in by 3.16 in by 1.14 in. The other fragment has dimensions of 3 in by 1.94 in by 1.14 in. In the top and bottom surfaces of the fragments are flat imprints of adjacent bricks; thus, the specimens represent the full thickness of a mortar joint. Side of the fragments are mostly broken surfaces, although a few surfaces are weathered, rounded mortar surfaces and one surface is the overtop flange of the back side of a brick.

Mortar Aggregates

The aggregate is uniformly dispersed throughout the mortar. Measured maximum aggregate size is 4.75 mm (0.19 in) passing the No. 41.8 standard mesh sieve (Figure 5). However, coarse grains are rare. Most of the aggregate is finer than 0.075 mm (No. 200) sieve (Figure 6). The aggregate is close to but slightly finer than the gradation required by ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar.

Aggregate is natural sand composed of a wide variety of rock and mineral types including quartz, feldspar, chert, calcite, dolomite and granite (Figure 4). Quartz is the most prominent mineral component of the aggregate. Aggregate is translucent, broken, tan and beige. Aggregate is hard, dense, with angular to sub-angular, matrix, angular in shape and has a smooth surface texture.

The aggregate does not exhibit deterioration or evidence of poor service performance. Rather, the aggregate observed appears to be performing as intended.

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January 9, 2013

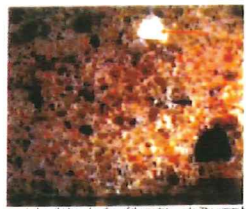


Figure 3. Petrograph showing the top surface of the mortar sample. The surface is highly cemented and shows a dense matrix of aggregate particles.

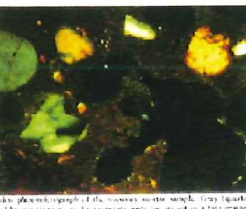


Figure 4. Petrograph showing the mortar matrix sample. The matrix is highly cemented and shows a dense matrix of aggregate particles.

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January 9, 2013

Thus, the gradation required in ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar is exceeded and is performing as intended. This sand is typical of glacial sands in the region often used as concrete and masonry aggregate.

- 4) A small amount of hydrated lime is present in the mortar matrix cement sand balls (Figure 3) and is estimated to be less than 1% by volume of paste (see also Table 2). No supplementary cementitious materials are observed. The cement is well hydrated in these areas. Very few residual cement particles or even traces of cement particles are present. Proportions of the mortar suggest a water content ratio estimated to be in the range of 0.45-0.60 (2). However, the paste now is soft, very porous and contains numerous microcracks (Figure 5), likely a result of freeze-thaw damage. Many of these microcracks are lined or filled with secondary calcium carbonate, suggesting moisture has migrated through the mortar, washed calcium from the cement paste and reprecipitated the calcium as calcium carbonate.

- 5) The mortar is not air entrained with many of the voids being small-to-large and irregularly shaped. Air content is estimated to be 8 to 12%. The air voids are lined with secondary deposits of calcium carbonate and ettringite, also suggesting migration of moisture into the mortar, and thus being susceptible to freeze-thaw damage when saturated.

- 6) Petrographic observations and the mortar proportions provided in Table 2 yield a composition that would be similar to a Type O Cementitious Mortar, even though ASTM C 270 - Standard Specification for Mortar for Masonry Units, even though ASTM C 270 was not in existence at the time this mortar was placed. An ASTM C 270 Type O Cementitious Mortar is required to have a 28 day minimum average compressive strength of 360 psi. Table X1.1 of the Appendix of ASTM C 270 indicates a Type O mortar is suitable for interior, non-load bearing partitions and exterior above grade, non-load bearing walls that are not likely to be frost when saturated.

- 7) Brick compressive strength test results are provided in Table 3 below:

Table 3. ASTM C 672 Brick Compressive Strength Test Results

Note: Brick compressive strength test results are provided in Table 3 below.

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Analysis of Masonry Mortar and Clay Brick  
Garver Feed Mill, Madison, WI  
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Mortar Cement Paste

A mortar joint is made by mixing together equal parts of aggregate particles (see Figure 3) with a proportion of water to form a paste. The aggregate particles are typically made of silica, alumina and iron oxides, and are typically made of silica, alumina and iron oxides.

The mortar is well hydrated in these areas. Very few residual cement particles or even traces of cement particles are present. Clear hydrated cement, a normal hydration product, cannot be discerned due to extensive paste carbonation. Hydrated lime is present in the mortar (Figure 3).

Proportions of the paste previously described are evaluated to provide an estimate of the water-cement ratio. Based on paste properties observed, water-cement ratio is estimated to be moderate, that is, estimated to be in the range of 0.45 to 0.55.

There are numerous microcracks in the paste (Figure 5), likely a result of freeze-thaw damage. Many of these microcracks are lined or filled with secondary calcium carbonate, suggesting moisture has migrated through the mortar, washed calcium from the cement paste and reprecipitated the calcium as calcium carbonate.

Mortar Air Voids

There are numerous small-to-large, irregularly shaped voids typical of entrapped air (Figure 4), but no smaller spherical voids typical of entrained air. Therefore, the mortar is non-air entrained.

An air void is estimated to be 8 to 12% by volume. The air voids are lined with secondary deposits of calcium carbonate and ettringite, suggesting migration of moisture into the mortar.

We sincerely appreciate your choice of Schmitt Technical Services, Inc. to assist you in this evaluation. If you have any questions or need additional consultation, please contact us.

STSI/ST

Schmitt Technical Services, Inc.

14010 Elm Street

Madison, WI 53714

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- 8) ASTM C 672 - Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale) requires that for exposure to severe weathering conditions (Grade SW), brick must have a minimum compressive strength of 2500 psi for an individual brick and 3000 psi for an average of 5 bricks. Data in Table 3 indicate the in place project bricks do not meet the average strength requirement and only one of the five bricks tested meets the individual strength requirement. The data does suggest some variability in strength, possibly due to certain locations being in better condition and higher strength than others. Thus, the data has to be analyzed against the field survey observations.

- 9) Brick absorption test results are provided in Table 4 below:

Table 4. ASTM C 672 Brick Absorption Test Results

Note: Initial rate of absorption was determined per STSI report.

- 10) For new building construction the Wisconsin Department of Administration, Division of State Facilities (DSF) requires the initial rate of absorption to be a minimum of 4 g/min/ft<sup>2</sup> for an individual brick and a minimum of 2 g/min/ft<sup>2</sup> for an average of five bricks. The project bricks meet this requirement. DSF also requires the initial rate of absorption to be a maximum of 75 g/min/ft<sup>2</sup> for an individual brick and a maximum of 20 g/min/ft<sup>2</sup> for an average of five bricks. The individual maximum requirement is exceeded in two of the bricks and the average of 5 is at the upper limit requirement. Again, the data has to be analyzed against the field survey observations to determine this variability.

- 11) ASTM C 672 also has requirements pertaining to severe weathering conditions for absorption and saturation coefficient. For Grade SW brick, the 24-hour absorption should not exceed 85% for individual bricks. All of the bricks exceed the 85% requirement.

- 12) ASTM C 672 states that if the 24-hour absorption requirement is exceeded, the brick should be replaced by both the 24-hour absorption and the saturation coefficient. For 24-hour absorption for Grade SW, brick should not exceed 1.7% for an average of 5 bricks and 20% for an individual brick. One of the bricks exceed the individual maximum requirement for 24-hour absorption. The average of five bricks for the 24-hour test exceeds the maximum limit.

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Analysis of Masonry Mortar and Clay Brick  
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Mortar Cement Paste

A mortar joint is made by mixing together equal parts of aggregate particles (see Figure 3) with a proportion of water to form a paste. The aggregate particles are typically made of silica, alumina and iron oxides, and are typically made of silica, alumina and iron oxides.

The mortar is well hydrated in these areas. Very few residual cement particles or even traces of cement particles are present. Clear hydrated cement, a normal hydration product, cannot be discerned due to extensive paste carbonation. Hydrated lime is present in the mortar (Figure 3).

Proportions of the paste previously described are evaluated to provide an estimate of the water-cement ratio. Based on paste properties observed, water-cement ratio is estimated to be moderate, that is, estimated to be in the range of 0.45 to 0.55.

There are numerous microcracks in the paste (Figure 5), likely a result of freeze-thaw damage. Many of these microcracks are lined or filled with secondary calcium carbonate, suggesting moisture has migrated through the mortar, washed calcium from the cement paste and reprecipitated the calcium as calcium carbonate.

Mortar Air Voids

There are numerous small-to-large, irregularly shaped voids typical of entrapped air (Figure 4), but no smaller spherical voids typical of entrained air. Therefore, the mortar is non-air entrained.

An air void is estimated to be 8 to 12% by volume. The air voids are lined with secondary deposits of calcium carbonate and ettringite, suggesting migration of moisture into the mortar.

We sincerely appreciate your choice of Schmitt Technical Services, Inc. to assist you in this evaluation. If you have any questions or need additional consultation, please contact us.

STSI/ST

Schmitt Technical Services, Inc.

14010 Elm Street

Madison, WI 53714

Phone: 608-833-7777

Fax: 608-833-7778

www.schmitt-tech.com

GENERAL SHEET NOTES

- A. REMOVE ALL GRAFFITI PER SPECIFICATIONS
- B. SEE AS4.01 FOR REMOVAL OF GMA & BRICK WINDOW INFILL

GARVER FEEDMILL REDEVELOPMENT PLAN

3241 GARVER GREEN  
MADISON, WI 53704

Client:  
GARVER FEED MILL LLC  
1030 W. Chicago Avenue, Suite 200  
Chicago, IL 60642



BAUM REVISION  
real estate development

REPAIR KEY NOTES

- TUCKPOINTING
- BRICK REPLACEMENT
- REPLACE OR REHABILITATE SILL/BELT COURSE
- REPLACE CLAY CAP WHERE BROKEN OR MISSING
- REPLACE OR REPAIR INDIVIDUAL DAMAGED BRICKS OR JOINTS PER SPECIFICATIONS

TUCKPOINTING:  
TYPICAL TUCKPOINTING IS THE REMOVAL OF SURFACE MORTAR TO A DEPTH OF 3/4 IN AND REPLACING IT WITH SUITABLE MORTAR.

BRICK REPLACEMENT:  
INVOLVES REPAIRING ALL MISSING AND DAMAGED BRICK, SOMETIMES MULTIPLE WYTHES DEEP IN AREAS WHERE THE MASONRY IS DEFECTIVE.

SMITHGROUP JJR



STRUCTURAL integrity  
Architects • Madison, WI

design coalition  
Architects • Madison, WI

BACHMANN  
CONSTRUCTION

ISSUED FOR

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SEALS AND SIGNATURES

REFERENCE KEY NOTES

- 1. RAISE PARAPET AS NEEDED TO ACCOMMODATE ROOF INSULATION
- 2. PRESERVE ORIGINAL SHADOW LETTERING

SHEET TITLE  
SCHMITT TECHNICAL SERVICES REPORT

PROJECT NUMBER

AR4.0.3

SHEET NUMBER



















