

TOMB PLAQUE REPORT

MOUNT VERNON
MOUNT VERNON, VIRGINIA

STONE INVESTIGATION

AND

RESTORATION OF TOMB WALL PLAQUE

Prepared for the

**Mount Vernon Ladies' Association of the Union
Mount Vernon, Virginia**

August, 1999

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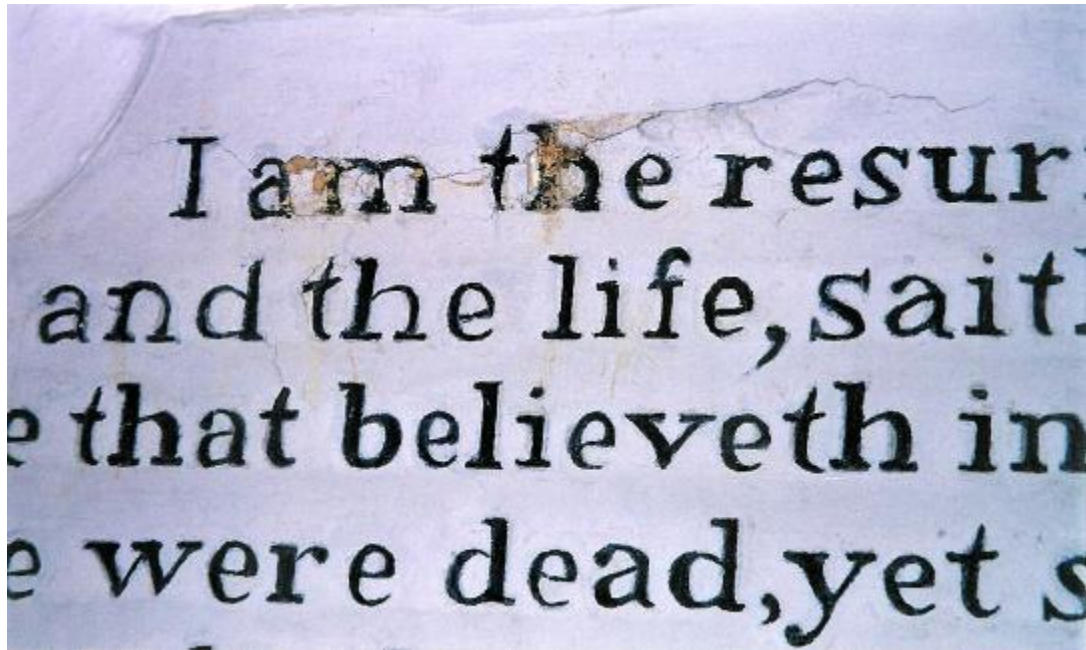


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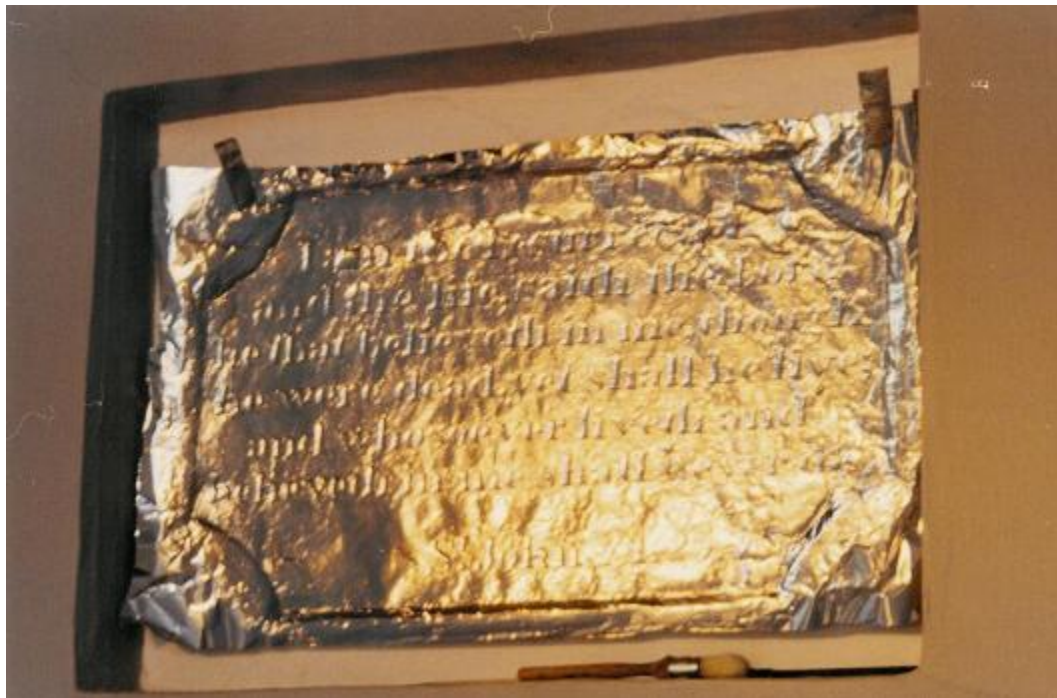
IRVING SLAVID *Conservator*
PROF. NORMAN R. WEISS *Consultant*

This report presents a summary of conservation work recently completed on the carved stone plaque incorporated in the rear wall of the New Tomb vestibule. Our initial visual inspection of the plaque was at the time of our December 10, 1998 site visit. This resulted in the discussion of techniques (presented as alternatives) in the December 28 letter of proposal.¹ You will recall that, at that time, the paint and repair stuccos made it impossible to determine either the extent of surviving original material or the overall condition. Hence, two of the three alternatives suggested that the plaque would require removal from the wall. (These approaches seemed reasonable based on the presumption that the plaque was the raised field only, and that it was, therefore, relatively thin.)

Our first site work was on March 11 and 12, 1999. We began with some general photography, to supplement the close-ups shot on December 10. The first significant procedure was the preparation of a metal foil impression of the raised field, which was used immediately to create an on-site plaster cast. By this means, no three-dimensional information concerning the pre-treatment condition would risk being lost as we commenced exploratory work.



Condition of the raised field as first observed in December, 1998.

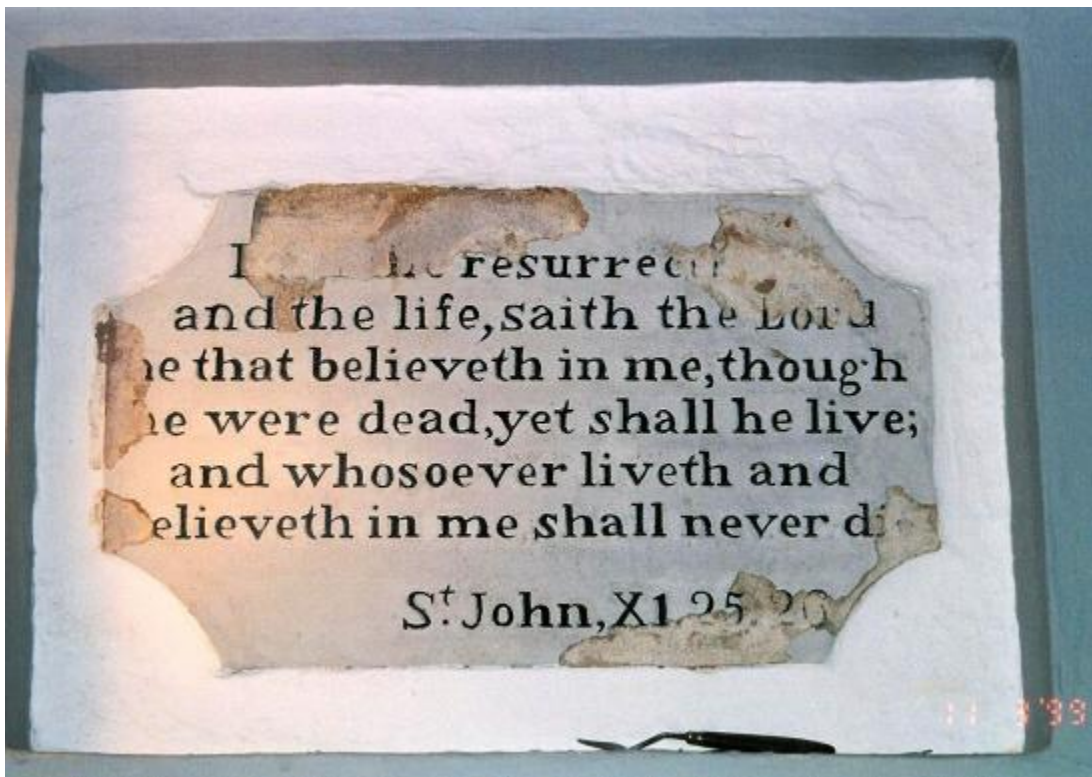


Metal foil impression (in place) of the raised field.

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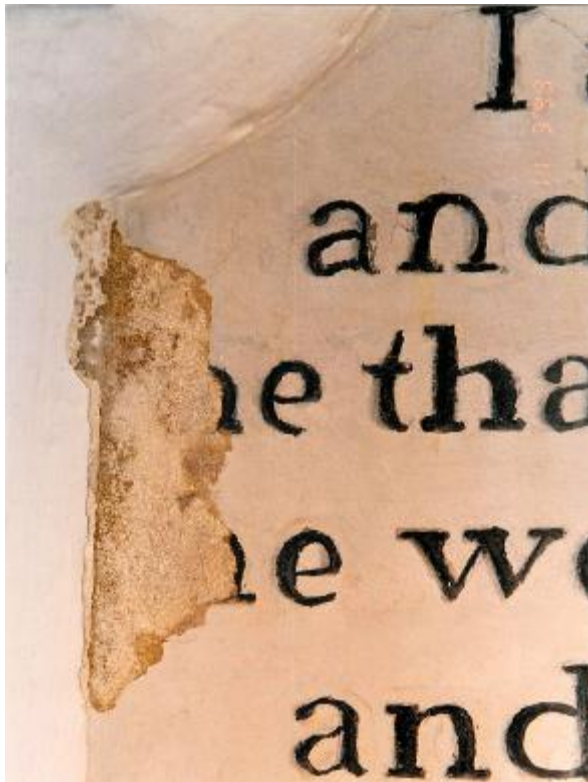
Several areas of stucco--most of them quite loose--were removed with scalpels and palette knives. These were along the top, the left-hand edge, and the curve at the lower right. The overlap of some of these repair materials on to the border made it quite clear to us at this stage that the raised (lettered) field and the border were a single piece of stone, and that the stone was, indeed, Aquia Creek sandstone. It now also seemed that most of the severe deterioration visible at individual locations of paint perforation was associated with failed repairs, although the largely well-adhered paint made any further observations concerning stone condition impossible.



Plaque after removal of loose stucco fills.

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Detail, left edge of field.

The Aquia Creek stone is a Lower Cretaceous rock composed of quartz, some weathered feldspar, and pockets of clay. The cementing constituent is silica.² It is best known for its use in some of the first prominent structures erected in the new Federal City, including the Capitol, and the White House. Robert Mills used this sandstone for the earliest portions of the Patent Office³ and the Treasury Building. These projects, undertaken at about same time as the construction of the New Tomb, represent the last large-scale use of the Aquia Creek stone.

²Withington, Charles F. Building Stones of our Nation's Capital. Washington: U.S. Geological Survey, 1975, pp. 7-11. Further mineralogical details are available in a document prepared for Masonry Stabilization Services Corporation by James B. Murowchick (Dept. of Geosciences, Univ. of Missouri-Kansas City), dated 2 December 1992; this was incorporated into MSSC "Laboratory Report 9211-11" on the U.S. Capitol Gatehouses and Gateposts.

³Starting in 1836, Mills supervised the construction of this portion of the building (much of the F Street facade), which was completed in 1840. The design was actually that of William Parker Elliott.

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Mills completed his work at the Treasury in 1842, but in a very short time some problems were observed. A report of the Building Committee of the Smithsonian Institution dated December 7, 1847 noted that

the Acquia [sic] Creek freestone, heretofore used in public buildings in Washington, is a material not to be trusted to, being pervaded by dark specks of the protoxide and peroxide of iron, which in peroxidating acquire a yellowish or reddish color, and having occasional clay holes, such as disfigure the Treasury and Patent Office.⁴

In fact, in 1839 a resolution was submitted to the 25th Congress in an attempt to discourage further use of Aquia Creek sandstone in public buildings.

Whereas the materials used in the erection of the Treasury building in this city are congelated sandstone, absorbing water, and requiring to be frequently painted at great expense, to preserve it against rain and frost: therefore
Resolved, as the sense of this House, That all public buildings hereafter to be erected for the use of the Government, shall be constructed of the hardest and most durable materials, either marble or granite.⁵

Thus, it appeared to us that the repair and over-painting of the Tomb plaque might parallel the problematic history of the care of several important sandstone buildings of the period. Paint samples were taken on March 11-12 from both the lettered field and the border. Preliminary examination of them was in your conservation facility, with a variable magnification stereobinocular microscope. Five groups of samples were subsequently mounted in a polyester casting resin in order to prepare twelve polished cross-sections.⁶ They were from the following locations:

- 1) old repair area, upper right of field;
- 2) field, top left above letter "I";
- 3) right edge;
- 4) top edge; and
- 5) border.

⁴Incorporated in Note A, Appendix of Owen, Robert Dale. Hints on Public Architecture. New York: G.P. Putnam, 1849 (reprinted New York: DaCapo Press, 1978).

⁵Resolution Number 15, House of Representatives, 25th Congress, third session, January 28, 1839, "Stone for Public Buildings." Subsequent work at the Treasury Building between 1855 and 1869 was of Maine granite; in 1907, the sandstone along Fifteenth Street was removed and replaced with Milford, MA granite.

⁶This work was done by Ms. Margaret Breuker, of Columbia University.

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Some samples from stone within the lettered field show the same paint sequence (a gray primer/filler, 1-2 layers of a yellow buff, then 1-2 layers of light gray) as on areas of old (fine-grained) fills, strongly suggesting that the field was first painted when repairs were necessitated by its deteriorating condition. The border shows a more complex sequence. There are more numerous layers (up to nine different colors), with several bright whites most recently applied.

Although we are aware of no written evidence for the dating of the first repairs, the number of re-paintings of the border and of the fills at the very edge of the field suggests that this work was probably done in the 19th century. We undertook (on March 31-April 1) a review of historic photographs of the New Tomb in the MVLA Library. There are many overall photographs, but relatively few that include an "readable" image of the plaque itself. These are:

- 1) ca. 1898, general exterior view, from distance; relatively dark field (same value as rear wall) with lighter border;
- 2) 1917, visit of British & French Missions; relatively dark field with lighter border;
- 3) 1939, King George VI; relatively dark, mottled field with white border;
- 4) 1942, Prime Minister Churchill and President Roosevelt; dark, mottled field (darker in value than rear wall) with white border;
- 5) 1947, President Aleman of Mexico; dark, mottled field (darker in value than rear wall) with white border. Some deterioration is visible diagonally at the upper right-hand corner of the field, through the words "resurrection", "the Lord", and "believes". The word "die" is badly damaged.

Our initial interpretation of these photographs was prior to the detailed laboratory study of the mounted cross-sections in May and June. Thus, it first seemed to us that the field remained un-painted until at least 1947. We now believe that the yellow-buff paint is relatively old, and that it was carefully applied to avoid covering black paint ("pencilling") that was used within the carved letters. The yellow-buff paint was presumably employed in an attempt to conceal the earliest repairs with a color that was a reasonably good match to the Aquia Creek stone.

For much of the history of the plaque, at least since ca. 1898, the border has been painted to contrast with the field. The physical evidence from the cross-sections corroborates that of the photographs. (As we noted in our e-mail memo of June 29, the first contrasting color of the border is a pale putty that is close to Benjamin Moore HC-173.)

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Finally, the light gray paint of the field (and the sloppily-applied glossy black pencilling) that we observed during our first visit are--as we presumed--modern. Neither is seen in the 1947 photograph of President Aleman.

After small-scale testing, removal of paint from the field was begun with "Peel Away 7" (Dumond Chemicals, New York, NY). This product is a thickened solvent-based stripper that is applied in conjunction with a micro-perforated synthetic membrane that aids in the disposal of the softened paint and excess product. Despite the incompleteness of stripping, even a single treatment of 20-25 minutes resulted in a noticeable sharpening of the lettering, attributable to the removal of much of the paint, and (most especially) the elimination of the slovenly pencilling that overlaps the most recent gray.



Initial testing of paint stripping.

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Longer application times (up to 3 hours) were more successful, but always resulted in a smearing of both the pale yellow and the gray.⁷ Much of this could be eliminated with brush application (and blotting) of ethanolic ammonium hydroxide, which revealed an earlier layer of black pencilling. The latter has survived in reasonably good condition, appears to pre-date the first repairs, and is almost certainly original.



Application of "Peel Away 7" to upper portion of field.

⁷It should be noted that the commercial stripping of oil-based paints, most especially in multiple coats, is often more efficiently accomplished with alkaline (rather than solvent-based) products. These are based on sodium and/or potassium hydroxide, and can be applied for much longer periods of time. It was our determination, however, that there was a very significant risk of discoloration of the light-colored Aquia Creek stone with this method, because of the established sensitivity of its iron-containing minerals, and the high (typically 13 to 14) pH of such strippers. As our goal (for the lettered field) was the presentation of cleaned stone, we chose to carry out repeated applications of solvent-based formulations. We made limited use of alkalinity in two controllable situations. In one (ethanolic ammonium hydroxide), the volatility of the alkaline component and the method of use avoided prolonged exposure of the stone to conditions of high pH. In the other ("Rock Miracle"), the concentration of ammonium hydroxide is considerably lower, and has not, in our prior experience, posed a significant problem.

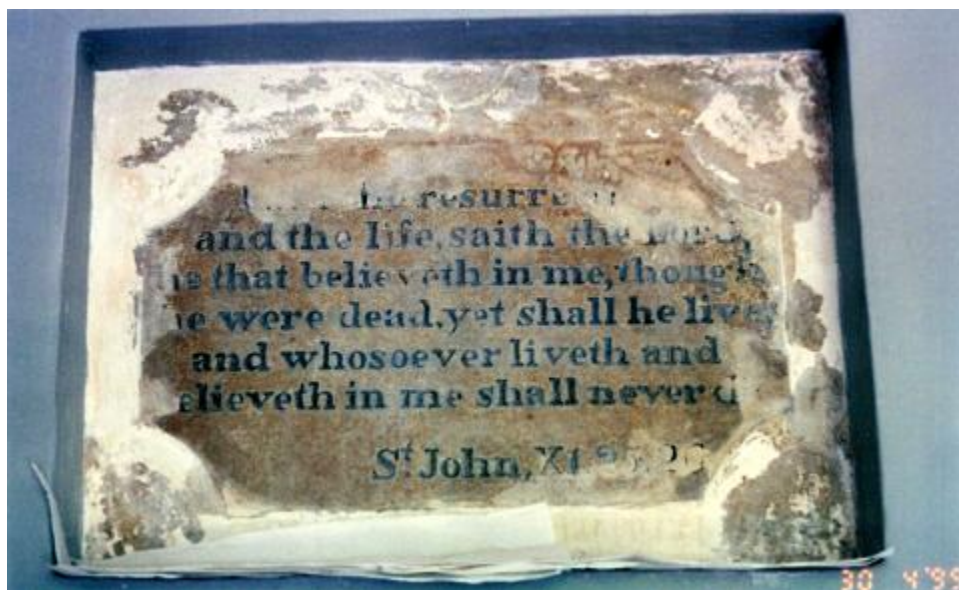
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Chemical paint stripping continued through the second site visit (March 31-April 1), including partial removal of paint from the border, to permit re-painting of its irregular surface at a later date.⁸

Final cleaning of the lettered field was done on April 29, combining chemical methods with the careful use of stainless steel dental tools. Stripping continued with three short (15-20 minute) applications of "Rock Miracle" (Samax Enterprises, Inc.), an ammoniated methylene chloride-based gel. Each of these applications was followed with a water rinse, using a hand-held mister. Repeated scrubbing with ethanolic ammonium hydroxide enhanced the cleaning, but could not entirely eliminate the grayish haze of partially solublized paint.

The heaviest individual areas of this residue were slowly cleaned with an "AEC AirEraser" (Paasche Airbrush Company, Harwood Heights, IL) running at 85 psi tank pressure.



Completion of paint removal from field.

⁸Our thoughts on this subject were summarized in the June 29 e-mail memo (Irving Slavid, to Dennis Pogue, "Re: border painting"). We offered two ideas:

"a) Paint the border to match the average color of the cleaned and restored stone as it is today. ...

b) Paint the border the first contrasting color, a pale putty.... It seems that the field continued to look yellow-buff for a very long time.... We see this contrast of field and border in all of the historical photos that we examined, back to ca. 1898."

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The micro-abrasive used was dolomite⁹, passing a No. 100 screen, and retained on a No. 200. This fine powder was dessicated to improve flow characteristics. Overall dry cleaning was again with the AirEraser, but with (dessicated) dolomite passing No. 200. As a final clean-up, surface dust was removed with compressed air, then with an ultra-low volume (ULV) water rinse at 85 psi.



Application of "Conservare OH" consolidant

Consolidation treatment of the entire plaque with ethyl silicate¹⁰ was performed on April 30, after testing (both in vitro and on the wall) to determine that there would be no softening of the paint remaining on the border.

⁹Dolomite (calcium magnesium carbonate), with a Mohs hardness of 3.5 to 4, is considered a "soft" abrasive.

¹⁰Ethyl silicate consolidation has a lengthy history, especially for the treatment of sandstone; see Grissom, Carol A. and Norman R. Weiss, "Alkoxysilanes in the conservation of art and architecture: 1861-1981," Art and Archaeology Technical Abstracts, 18 (1), 150-202 (1981). Some discussion of its use in the United States is presented by Weiss, Norman R., "Chemical treatments for masonry: an American history," APT Bulletin, XXVI (4), 9-16 (1995). The consolidants manufactured in Germany by Wacker-Chemie were introduced into North America by ProSoCo, Inc. in 1985, although ethyl silicate formulations were already known in this country by World War II. A U.S. patent on the use of ethyl silicate for soil consolidation was granted in 1942 (Stone, John B. and Abraham J. Teplitz, "Earth consolidation," U.S. Patent No. 2,281,810, May 5, 1942).

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Treatment was repeated brush application of an ethanol-based version of "Conservare OH" (ProSoCo, Inc., Kansas City, KS), in three "cycles" of three applications each. Each application involves flooding the stone surface to a condition of saturation. Drying time between applications was 10-25 minutes for the first two cycles and up to 35 minutes in the third cycle. Time between cycles was 45 minutes, then 90 minutes. The surface was brushed with ethanol--to remove any excess consolidant--about 30 minutes after the final application. Total treatment time was approximately 5 hours.

It was our decision to avoid the use of repair stuccos for the re-building of the surface and (therefore) of the missing letters of the inscription. Most of the losses were quite shallow, making patching difficult without considerable removal of sound, original material, which seemed contrary to our overall approach.

Instead, we developed a method for the re-creation of the missing portions of the inscription in a thin, lightly pigmented layer of an acrylic coating that could be re-solublized in the future, and required no mechanical pre-treatment of the stone surface. This was made possible by execution of a wax rubbing (on paper) of the necessary letters from the cleaned plaque on April 29. This work, in turn, permitted the preparation (during the month of May) of 4 sheets of stencils in our laboratory, utilizing the plaster cast done on March 11 to establish letter spacing and positioning.



Use of stencils to apply isolating layer.

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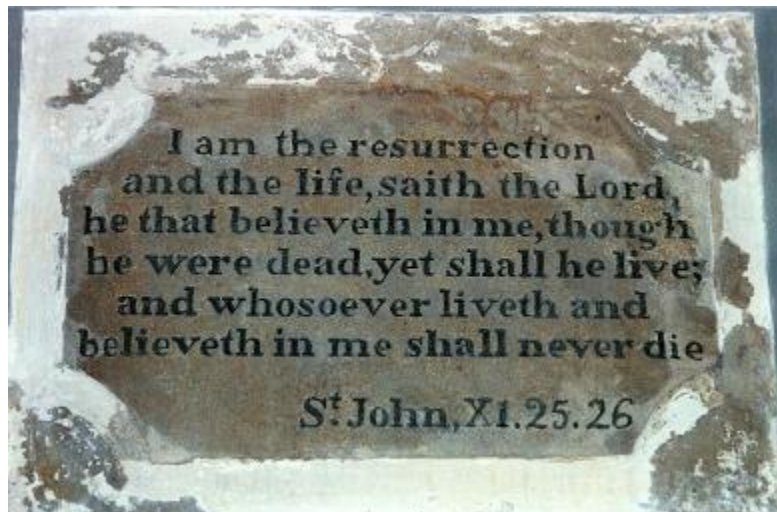
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Preliminary testing of our method was on a sample of Aquia Creek sandstone taken from the Mansion cellar for core drilling, as part of a study recently completed for the MVLA.¹¹ This stone was treated with three cycles of the ethanol-based version of "Conservare OH" on April 3. After several weeks of curing, it was utilized for sample lettering trials, to determine materials and methods, including dilution and pigment loading.

Field execution of the selected method was on June 3. Using the stencils, an isolating layer (conforming precisely to the shape of each of the missing letters) of "Liquitex Soluvar Matte Varnish" (Binney & Smith Inc., Easton, PA) was brush applied, at a dilution of 4 parts varnish to 1 part mineral spirits.¹² This treatment was also performed to the surviving black pencilling exposed by our cleaning. Drying time was approximately 30 minutes.

For the letters being re-created, a second layer of pigmented "Soluvar" was applied freehand. The pigment used was "BayFerrox 330", a black synthetic iron oxide (Bayer Corp., Pittsburgh, PA). Dispersion of the pigment was with the brush, on an aluminum palette. Use of colorant in the upper layer only will prevent the unwanted contact of pigment particles with the stone surface during removal, should that ever prove to be necessary.

August 9, 1999



Completion of conservation treatments.

¹¹Mansion Cellar Report: stone investigation and recommendations for treatment," dated June, 1999, Monument Conservation Collaborative LLC, 21 pp., plus 8 pp. of product data.

¹²Soluvar" is said to be a polymer of iso-butyl methacrylate, similar to Acryloid B-67. It is readily soluble in hydrocarbon solvents, such as mineral spirits, VM&P naphtha, or odorless paint thinner.