CONSERVATION ASSESSMENT

For

MEMORIAL TO THE START WESTWARD
SCULPTURE AND PYLONS
MARIETTA, OHIO

Prepared For

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REVISED

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INTRODUCTION

This report presents a conservation assessment of the sandstone sculpture and four sandstone pylons on Front Street that form part of the Memorial to the Start Westward located in Muskingum Park in Marietta, Ohio. Lorraine Schnabel of Schnabel Conservation L.L.C. performed an on-site assessment from June 15 to June 17, 2020 during which time the weather was dry and clear.

All the information on the history of the memorial assembled by the Start Westward Monument Society was provided by Woolpert and included correspondence, photographs, newspaper reports and other records of not only the original construction but also later repair and restoration efforts. Because this information played a significant role in informing the assessment, and is important for understanding the recommendations, relevant items are included as an appendix to this report (Appendix A). Work in the park was facilitated by Joe Tucker, engineer for the City of Marietta.

HISTORICAL BACKGROUND

The Memorial to the Start Westward was constructed as part of the celebration of the 125th anniversary of the passage of the Northwest Ordinance in 1787 which formed the Northwest Territory. The idea of the "Northwest Territory Celebration" was conceived in 1934 in Marietta, Ohio, and ultimately set into motion by an Act of Congress in 1935. The celebration was partially funded by the federal government, but also received funding from a number of states formed from the Northwest Territory including Ohio, Illinois, Indiana, Michigan, Minnesota and Wisconsin. The Northwest Territory Celebration was massive in scope and scale, including publication of a map and a book, issuance of a stamp, and a caravan that travelled the route of the pioneers, with staged pageantry along the way.

One of the planned outcomes of the Celebration was a permanent memorial to mark "…the point where the United States made its first footprints as it started west to span a continent and to become eminent among all nations."[1] The Memorial to the Start Westward, which includes not only the sculpture and pylons but also an esplanade to the river and paving and stairs to Front Street, was designed *pro bono* by John P. Schooley, then architect for the state of Ohio. The sculpture was designed and partly carved by Gutzon Borglum, a sculptor perhaps best known now for his design of Mount Rushmore. The vast majority of the work, including most of the carving of the sculpture and the eagles atop the pylons, was done by stone cutters, carvers and setters employed by the Works Progress Administration drawn at least in part from the local Ohio stone industry. The Memorial was dedicated in July of 1938, but historical documentation suggests that the carving of the sculpture was not completed until the fall of 1938.

SCULPTURE

Description

The sculpture, carved from sandstone reportedly obtained from Constitution, Ohio,[2] consists of two groups of figures. Three standing figures on a tall base face Front Street[3] (Photo 1); three additional figures that appear to be seated in a boat face the river (Photo 2). The portion of the sculpture with the standing figures projects slightly from the portion with boat (Photos 3-4; Figure 1). The figures and boat are raised on a sandstone base that is two courses of ashlar stone; the upper arris of the top course is beveled. The bottom course varies in height from 16 inches at the east side to 17 inches at the west side; the uncarved portion of the top course is uniformly 7 inches for a total base height of between 23 and 24 inches. The boat rises approximately 24 inches above the base; the top of the standing figure sculpture is approximately 12 feet above the base.

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[1] *Final Report of the Northwest Territory Celebration Commission*, p. 48

[2] No information was found on the location of the quarry. The historic geologic literature on the sandstone from Ohio barely mentions production near Marietta because it was so minor relative to other parts of the state.

[3] For the purposes of this report, the elevation facing Front Street is designated as east.

Photo 1: Sculpture east elevation; faces Front Street (all dimensions are approximate, and added only to provide a sense of scale; all images taken by Lorraine Schnabel in June of 2020 unless otherwise noted).

Photo 3: below, right. Sculpture, west elevation; faces the river.

Photo 3: Sculpture south elevation.

Photo 4: Sculpture north elevation.

Understanding the construction of the sculpture is important for understanding options for treatment. Figure 1 shows a sketch of the sculpture in plan, showing not only the layout and scale, but also the general configuration and location of the large block from which the figure group was carved. There is historic documentation in the form of photographs of the single large block of stone from which all the figures were carved, but little information on how the sculpture was assembled, and how the carved portions outside the primary large figure block were added. Based on the joint lines, the boat appears to have been added as two large blocks to either side of the central figure block (Photo 5). The "water" carved around the base of the boat appears to be part of these boat blocks (Photo 5) and is extremely thin (Photos 6, 7). Interestingly, the thinness of this detail seems to match the image of the clay model prepared by Borglum (Photo 8).

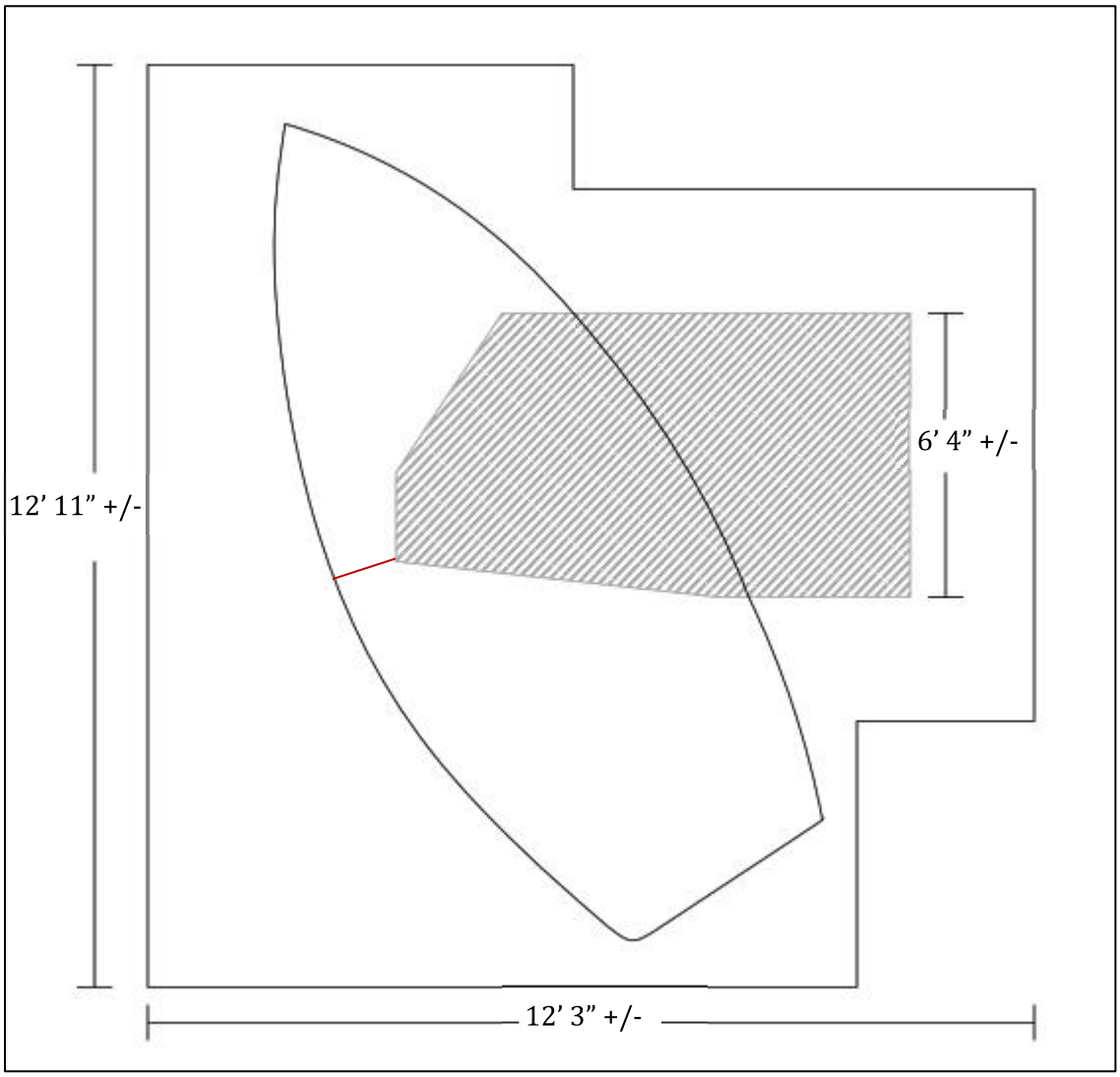


Figure 1: Sketch plan of the sculpture. The outermost line is the shape of the sculpture along the base where it intersects the pavement. The shaded area within is the very approximate outline of the shape of the large block of stone containing the figures; the dimension of this was taken at the joint between the figure block and the base stones. The rough dimension of the boat is outlined, with the joint line between the two additional large blocks of stone that were used to carve the boat shown in red.

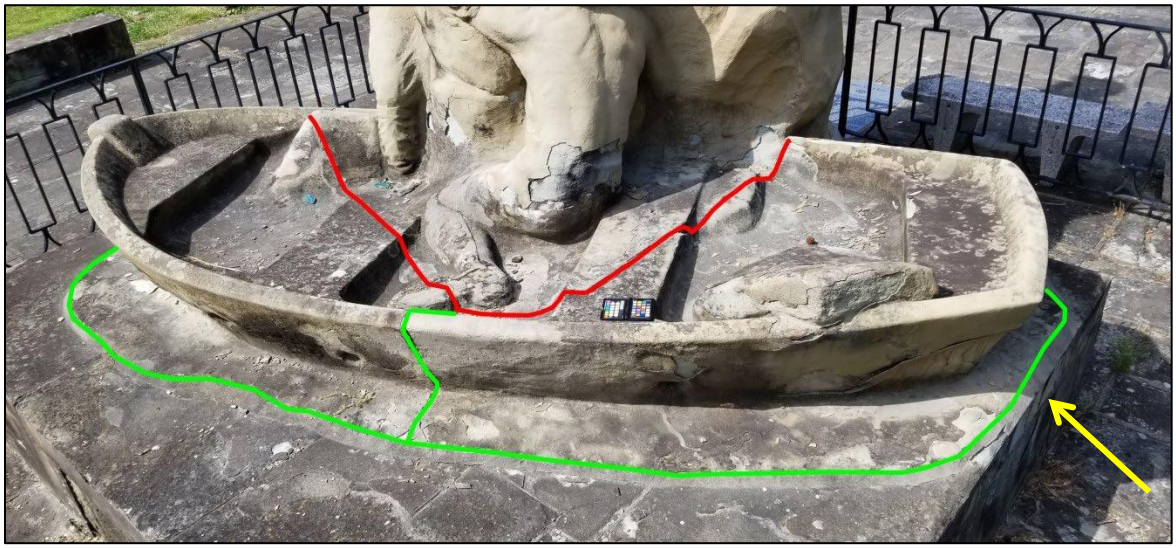


Photo 5: Detail of the top of the sculpture at the west side. The red line is the joint between the sculpture block and the boat blocks; the green lines show the extent of the two boat blocks. The "water" beneath the boat is part of the boat blocks not the base, and is very thin—not more than 1 ½ inches thick—see Photos 6 and 7, taken at the yellow arrow.

Photos 6 and 7: Tool inserted into joint below the "water" shows it is not integral with the base.

Photos 8: Detail of an historic photograph of the clay model prepared by Borglum. Note the appearance of the water under the boat.

Treatment History

A record of treatment provided by the client is as follows (see Appendix A):

July 1947:	Spray application of "weatherproof sealing" by "personnel of the City Parks Dept. and Campus Martius under the direction of Louis Anderson." (The Marietta Daily Times, Wednesday, July 2, 1947, p. 1, col. 5)
April 1962:	Fred Mitchem, Route #1, Fleming, Ohio: Replaced center standing figure's head S. Durward Hoag, Marietta, Ohio: Supervised cleaning entire sculpture and applying silicone coating
September 1973:	Tom Vadakin, Marietta, Ohio: Cleaned an asphalt material from sculpture $235
August 1975:	Leo Wagner, 898 Brighter Blvd., Zanesville, Ohio, 614-452-0851: Reattached head on figure nearest the river $880
June 1988:	Steve Wisenbaugh, 3050 lndustry Dr., Lancaster, PA, 717-299-9333: Removed graffiti, filled cracks with color matched mortar and sealed entire sculpture $4,700
July 1988:	Marietta Kiwanis Club: Installed flags and lighting. $5,400

The treatments in 1947, 1962, and 1988 are believed to have had the most significant impact on the current condition of the sculpture; each is discussed below. Importantly, with the exception of the replacement of the head on the center figure and possibly the 1962 cleaning which are documented in a photograph, none of these treatments are verified in any of the documentation reviewed. There are no "after treatment" reports such as those typically issued by a conservator describing the work done and the materials used. All the documents are "pre-treatment," referencing work to be done. Because there are no after treatment reports we really don't know what was done to the sculpture.

1947: Surface treatment

The first supposed treatment of the sculpture in 1947 is extremely interesting because it may refer to the early use of a chemical called ethyl silicate, a monomeric organic silicate that polymerized in place to provide preservative treatment. There is good evidence that in the 1940's that ethyl silicate was being experimented with as a preservative and "weatherproofing" agent for porous masonry. Some of this research was funded by the Carbide and Carbon Chemicals Company, originally located in Clendenin and South Charleston West Virginia.[4] Of course, World War II was a pivotal time in the industrial development and exploration of polymers (plastics), so in the post-war period there were other polymeric materials that could have been used as well. However, the subsequent provision of treatment materials by a representative of Union Carbide (the successor company to the Carbide and Carbon Chemicals Company) in the 1962 work on the sculpture suggests there might have been an ongoing connection between the city and the company.[5]

1962: Overall cleaning and surface treatment; new center head

The work in 1962 was intended to include cleaning the sandstone ("with revolving steel brushes," Photo 9 and inset) and application of a "silicone treatment"; the head of the central figure was also replaced. The epoxy provided by the Union Carbide representative was likely used to reattach the head.

[4] H. D. Cogan and C.A. Setterstrom, "Ethyl Silicates" Industrial and Engineering Chemistry 39 (1947): 1364-1368. This work, which describes test treatments using ethyl silicate on a variety of buildings and monuments, was done by two researchers at the Mellon Institute of Industrial Research in fellowships funded by the Carbide and Carbon Chemicals Company.

[5] Memorandum dated March 23, 1962; see Appendix A.

The records of the 1962 treatment mention the use of "silicones" and a "silicones solution." There is no way of knowing what this material was for certain. In the 1960's there was active experimentation in the field of stone consolidation using silicones (organopolysiloxanes); these chemicals are still in use today as stone consolidants and water repellents. Interestingly, one recipient of the memo describing the work to be done is "Lewis B. Andersen, Custodian and Sup't. of Campus Martius Museum, Marietta, Ohio"; note that a "Louis Anderson" is referenced in the newspaper article from 1947 as directing the work. If the same person was involved in both projects, there is the possibility that the earlier treatment might also have been a silicone because of his familiarity with the product.

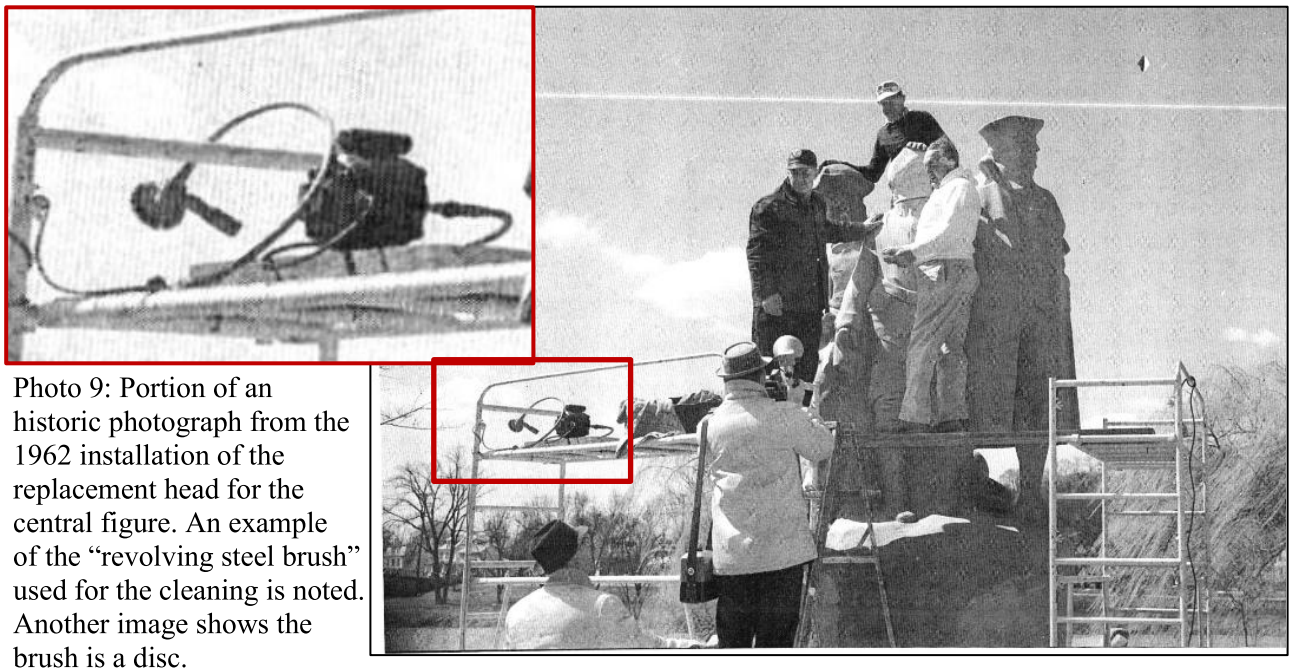


Photo 9: Portion of an historic photograph from the 1962 installation of the replacement head for the central figure. An example of the "revolving steel brush" used for the cleaning is noted. Another image shows the brush is a disc.

1988: Surface cleaning and sealing; repairs

Details of the 1988 work are limited to a letter from Steve Wisenbaugh describing in loose terms his plans for the work. However, he does reference cleaning, sealing, and repairs. There is the indication that "polyester resin adhesives in paste form with pigments and sandstone added" would be used for repairs.[6] If the work did, in fact, include a third additional campaign of cleaning and "sealing", then information about the materials and methods used could be helpful for understanding the existing conditions.

Observations

Visual observation of the sculpture was made from the ground, from various locations on the sculpture, with binoculars, and from an eight foot step ladder. Small tools were used to "sound" the condition of the stone and magnifiers were used make a closer examination of surface conditions. Observations can be divided into the following categories, each of which is described in some detail:

- Previous repairs
- Surface deterioration
- Surface soiling
- Conditions of the construction

[6] Letter, Steve Wisenbaugh to Joe Grimm, dated June 1, 1987. See Appendix A.

Previous repairs

The most visible previous repairs are the large areas of patching, observed at numerous locations. The most noticeable are those at the front of the sculpture at the carved base upon which the figures stand because of the crude attempt to match the tooling there (Photo 10). However, but there is also extensive smooth, untooled patching on and around the bottom of the boat and at the intersection between the rear figures and the boat; there are also numerous smaller patches at many locations on the figures and the base.

There are at least three types of patching material: one containing small ceramic microspheres, and two without (Photo 10). The patching with the ceramic microspheres is by far the most abundant material and the crudely tooled patches at the front of the sculpture at the base are this type of patching. However, the vast majority of the patch with microspheres is not tooled (Photo 11). At some locations there is dark streaking in a runoff pattern from the tops of the patches downward (Photo 11).

Samples of the patching material were taken from several locations on the sculpture, including the hull of the boat, the joint between the boat and the water, and the southwest side of the seated figure and examined under the microscope in reflected light at low magnification. When examined microscopically, there seem to be two distinct types of patching, one with ceramic microspheres and one without. Both types also contain sand and extensive entrained (added) air in the form of spherical bubbles in a broad range of sizes. The binder for the patching mortar containing the microspheres is a mix of organic material and acid-soluble material; the patching mortar without microspheres does not seem to contain any organic material. Both are hard and highly water repellent; water beads on a fresh fracture.

Photo 10: Detail of the lower right of the east elevation at the base showing two of the kinds of patching. The ceramic microspheres patching is circled in red (note the crude scratches in imitation of the chisel marks on the stone); the other patch type is roughly outlined in blue. Note the area below the joint and the large patch where the weathered yellow surface of the stone has been lost, revealing the blue color of the unweathered stone beneath (green arrows).

In many locations the patches are failing, peeling away from the underlying stone and falling off. One likely cause of the failure is that the patching material was applied too thinly and without sufficient mechanical keying or attachment to the underlying stone (Photo 12). The relative hardness and water repellency are also playing a role in the patch failure—the patches trap water in the stone underneath and are pushed off by freeze-thaw and other dimensional changes in the wet stone.

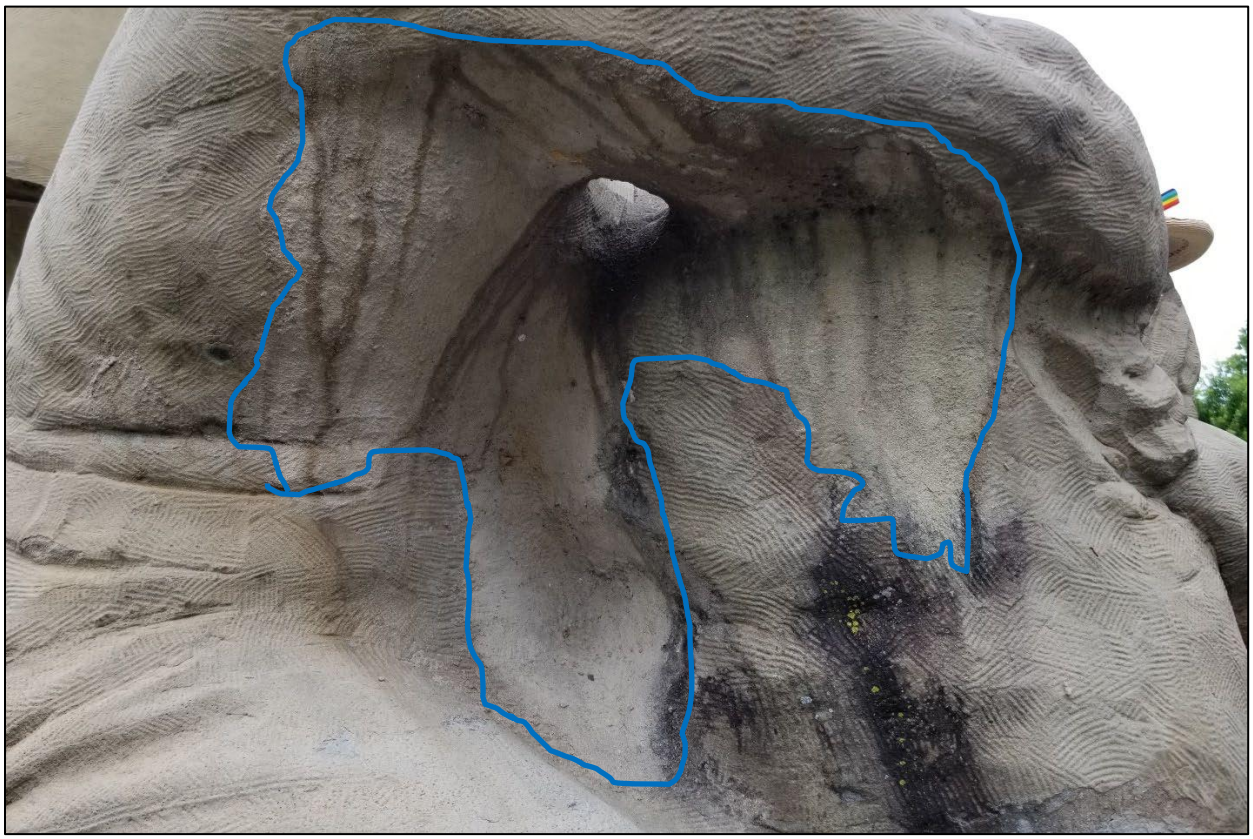


Photo 11: Detail of the north side of the sculpture showing the intersection between two of the figures in the boat. The patched area is roughly outlined in blue. The edges of the patches are indistinct because the patch has been smeared out onto the stone surface. The very dark discoloration at the lower right is biological growth—a "biofilm" including many different types of organisms.

In addition to patches, there is evidence of other treatments. The most prominent of these is a bright orange material that is observed mostly in protected areas of the sculpture, but also can be seen in crevices around high points such as boot and coat buttons. The most pronounced examples are in the folds and at the undersides of the standing figures coats (Photo 13) where it is sometimes associated with a white efflorescence, but the orange material also appears in protected areas all over the sculpture (Photo 14). The orange color often (but not always) appears near and on patching of the ceramic microsphere type but is distinct from it (Photo 15). The orange material has the character of an applied coating, and examination of a sample of patching with some of the orange material attached under the microscope at low magnification in reflected light seems to confirm the material is a coating of some kind that also contains very fine aggregate. Positively identifying this material and unraveling its relationship with the patching would require laboratory examination and testing of both the patching and the orange material.

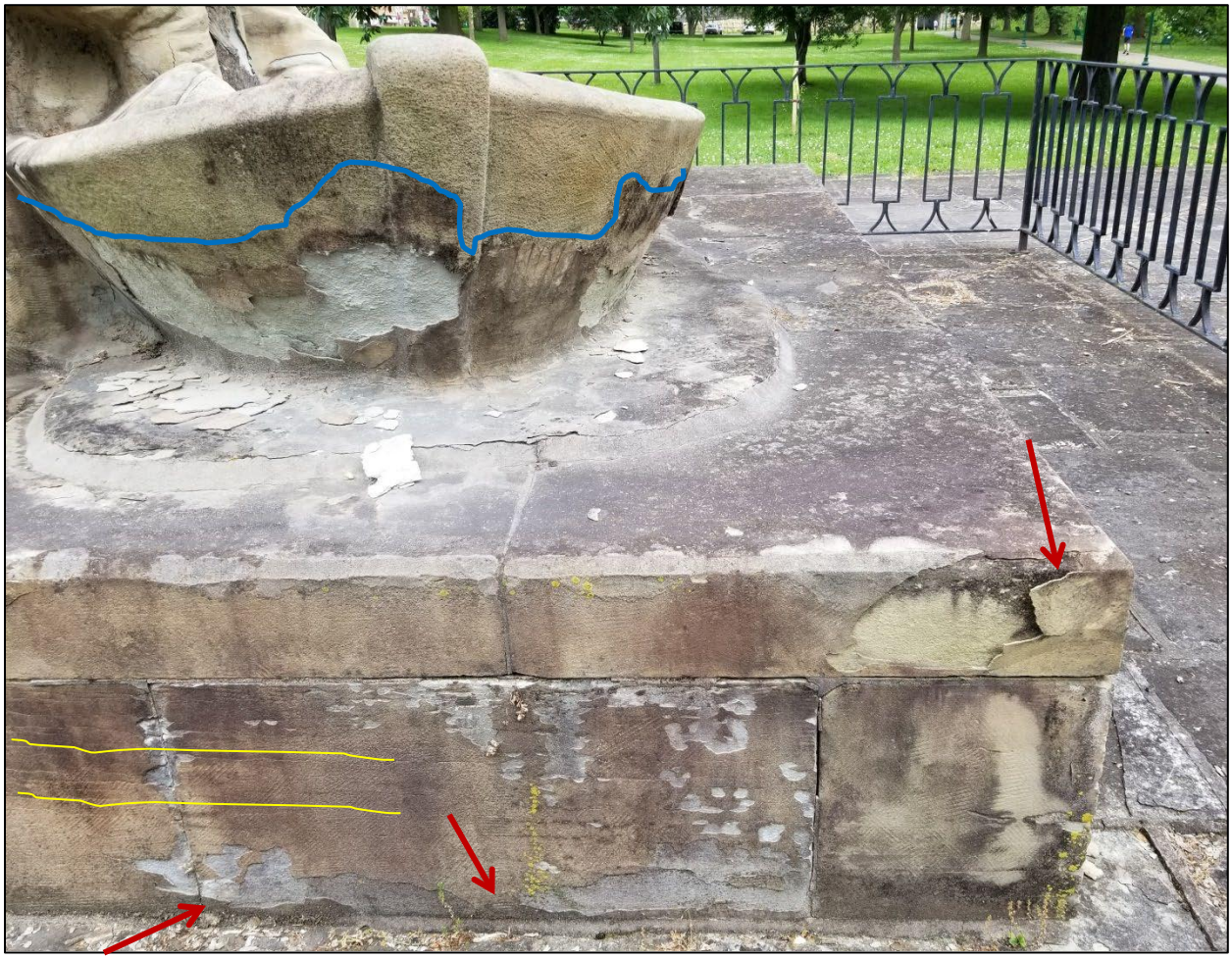


Photo 12: Detail of the north elevation of the sculpture towards the west end. Note the large area of failed patching at the side of the boat; other, adjacent patching is detached but has not yet fallen. This is the third type of patching noted, and seems to have been used extensively at the boat. It does not contain microspheres. The upper extent of patching is roughly outlined in blue. Note also the areas of peeling (defined under "Surface conditions") at the ashlar base stone (red arrows), and the delamination along the bedding in the bottom course of the base (parallel to the yellow lines, visible as faint horizontal lines).

More subtle is the treatment that was given to the faces of the two figures at the rear. Careful examination reveals that they have been given a thin slurry coating of a material that contains ceramic microspheres like the patches (Photos 16-19). The slurry coating does not seem to completely cover the faces; examination of a sample taken at the area of damage showing in Photos 16 and 19 reveals a thin smear of patching containing microspheres. The lack of detail on these faces may be due to weathering, but may also be partly due to blurring of detail from application of this slurry coating of patching.

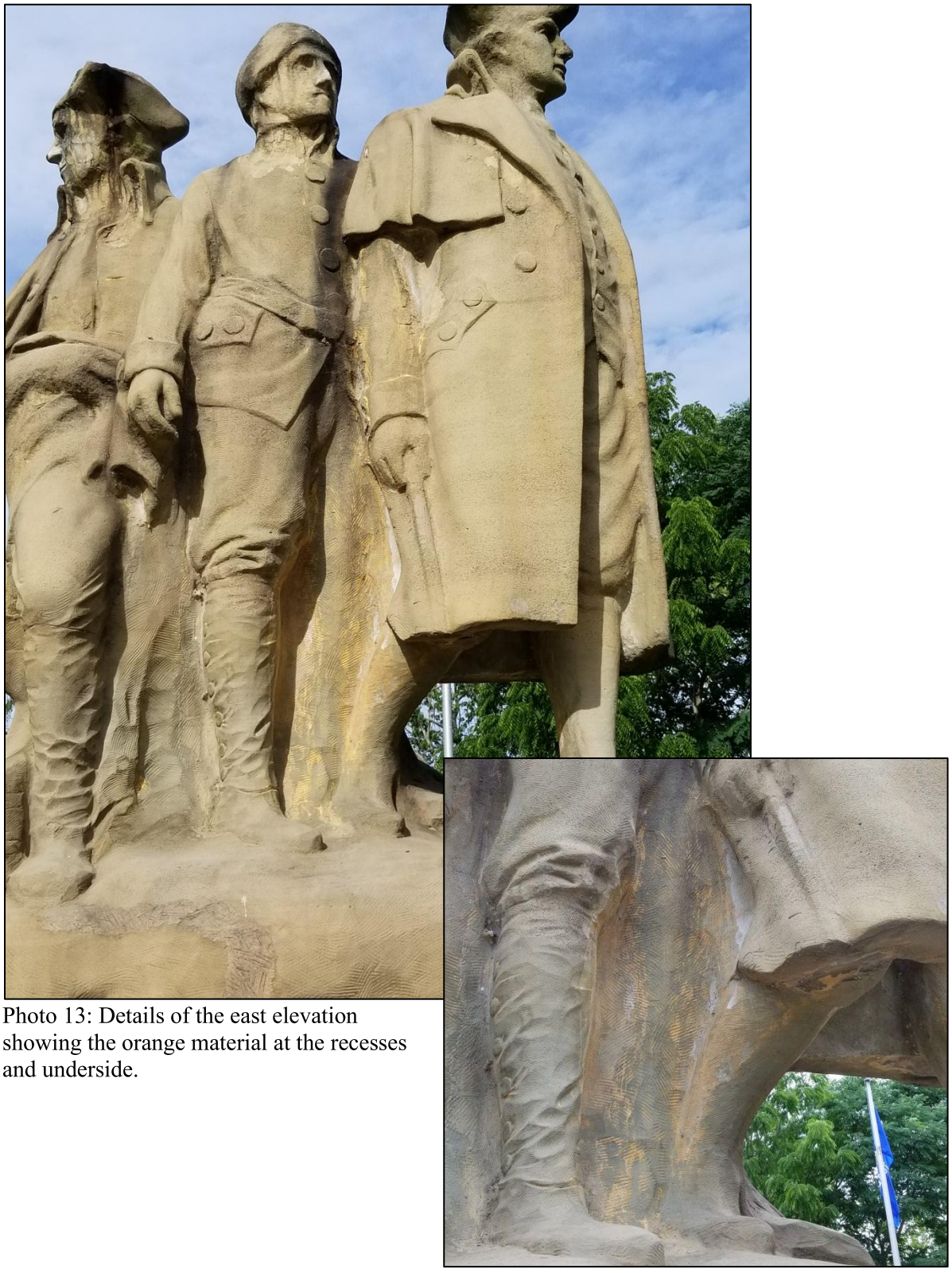


Photo 13: Details of the east elevation showing the orange material at the recesses and underside.

Photo 14: Detail of the northwest side of the north standing figure's leg showing the orange material and also some patching. The orange sometimes appears at the outer margins of patches like this.

Photo 15: view of the area at the tip of the finger (right), 10x magnification. The relationship between the patch (red arrows) and the orange material is unclear.

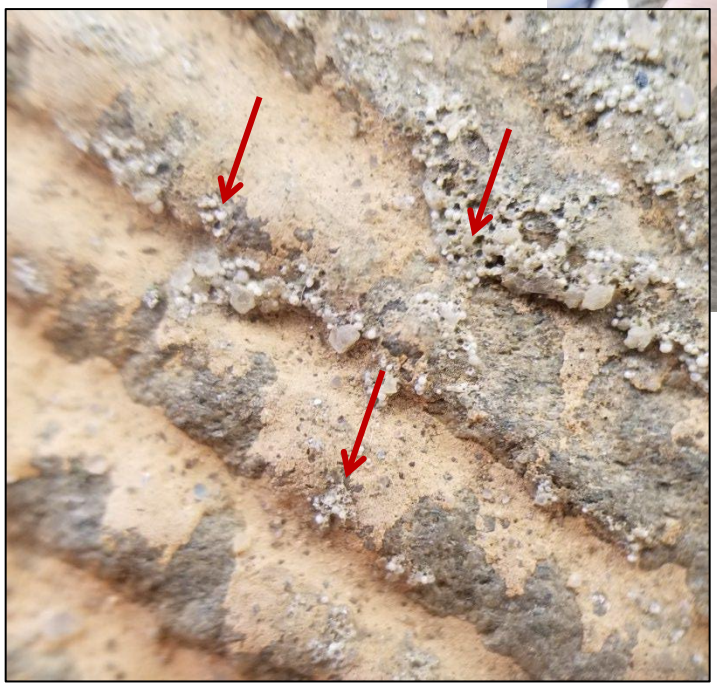


Photo 16, left: Detail of the face of the seated male figure facing south.

Photo 17, right: Detail of Photo 16.

Photo 18, left: Detail of Photo 17, 10x magnification. Note the tiny white dots, indicating the surface has a coating with ceramic microspheres.

Photo 19, above: Detail of the side of the face shown in Photos 16-18 showing cracking and peeling in the vicinity of the coating and a larger patch at the jaw, roughly outlined in blue.

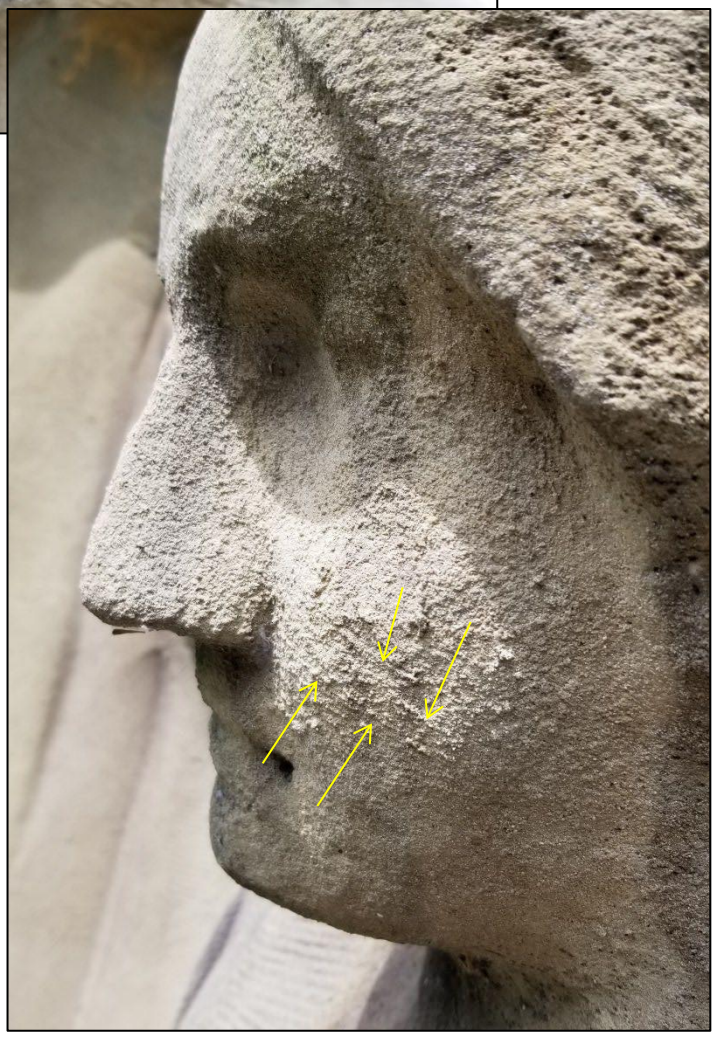


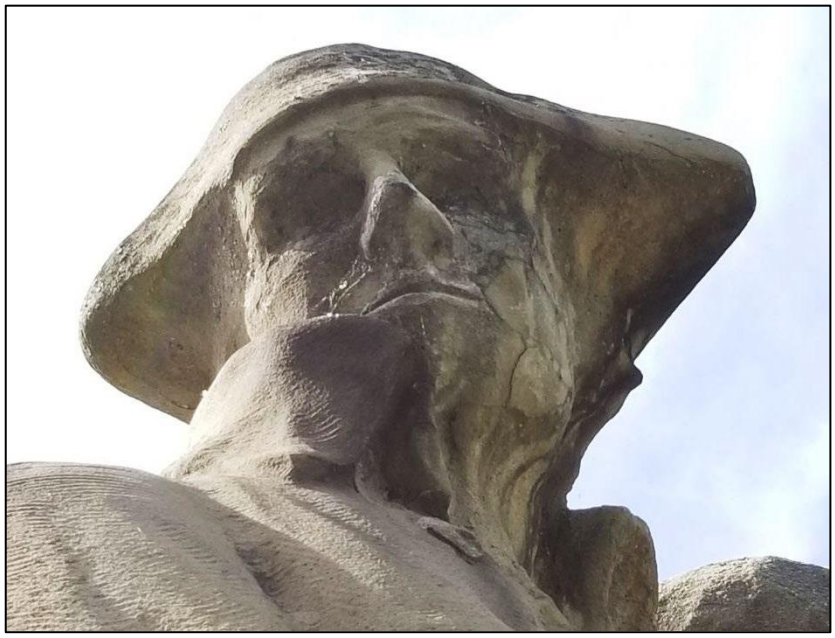
Photo 20, right: Detail of the southwest side of the female figure's face showing a similar coating application. Brushstrokes seem to be visible in the coating (yellow arrows).

Two other major previous repairs to the sculpture involve the heads of the figure sculpures. Records show that the head of the center figure was replaced in 1962 (Photo 9), and indicate that head of the southwest facing figure was re-attached in 1975. Evidence of intervention at both is obvious in the form of losses and patches (Photo 21). Both faces also have significantly less detail than that of the figure facing northeast (compare Photos 21 and 23 with Photo 22). The reason for the lack of detail is not clear. Lack of evidence for the craftsmen to work from when making their repairs may be one contributing factor, particularly at the center head. The head of the south figure may have been damaged on impact, eliminating detail that could not be re-created in the absence of photographic evidence. However, it is worth noting that despite significant evidence of weathering in many spots on the head and face of the north figure, fine carved detail remains. So weathering alone probably cannot be blamed for the loss of detail. Either the detail was never there to begin with, or was lost and could not be re-created. Unfortunately, the available historic photographs do not provide any clues as to the original character of the carved faces of the center and south figures (or the rear figures, for that matter, which also lack fine facial detail).

Photo 21: Detail of the heads of the center and south figures, which show obvious signs of intervention. Note the missing collar at the neck of the center figure, and the orange build-up on the jacket.

Photo 22: Detail of the heads of the center and north figures, which show the difference in detail. Note particularly the character of the eyes and mouth on the figure in the foreground.

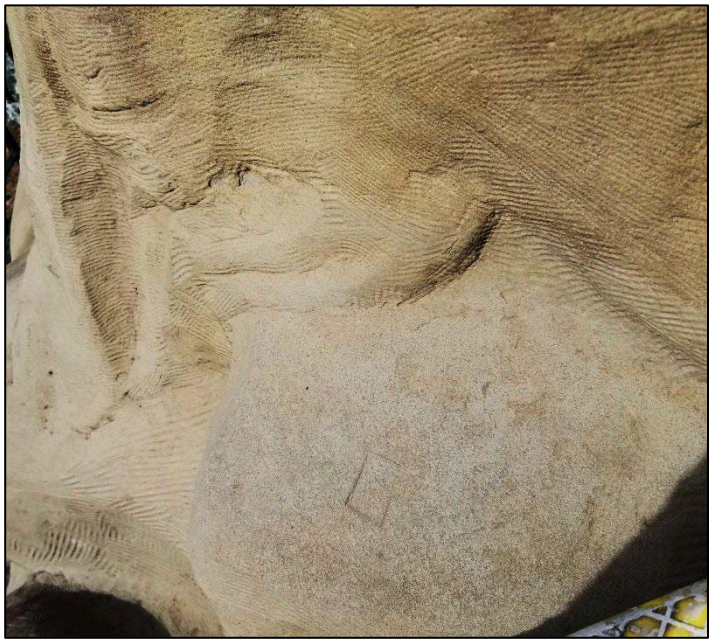
Photo 23: Detail of the head of the south figure showing the extent of repair. Each crack is associated with a patch.



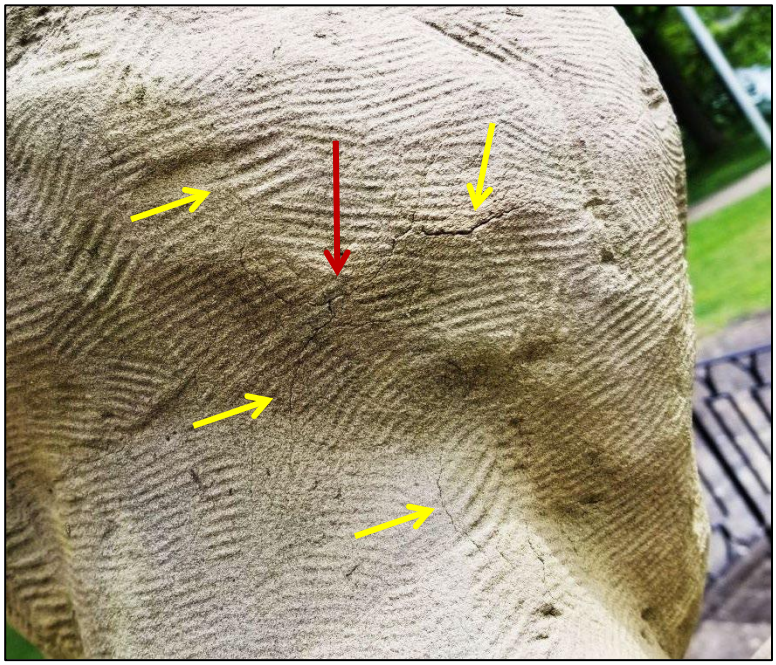
Surface deterioration

Four principle types of surface deterioration were observed on the sculpture: erosion, hairline cracking, blistering, peeling or spalling, and delamination. With the exception of delamination (discussed later), these are defined (and illustrated) as follows:

Erosion: the loss of surface through mechanical agents that physically abrade the surface. The photo shows an area at the rear of the sculpture where a horizontal, upward facing surface was likely used for climbing. The tooling visible on the adjacent vertical surface is completely lacking from the horizontal (the brightness and contrast of the image have been enhanced to show the variation). Erosion also happens naturally through the action of rain, wind, freeze-thaw and wet-dry cycling of saturated stone, and salt crystallization within the pores of the stone.



Hairline cracking: short, superficial cracks of limited extent; sometimes these cracks radiate from a point, but not always. In the image, multiple cracks (yellow arrows) extend from a central point (red arrow; brightness and contrast have been adjusted in the image to enhance the detail).



Blistering: separation of the surface of the stone from the underlying substrate. Blisters are not always circular in shape—this image, taken at the north side of the sculpture where the boat intersects the base, shows a rounded blister on the base and an elongated blister on the rim of the boar (yellow arrow). See also Photo 19. Because of the separation between the surface and the substrate, blistered areas sound hollow when tapped gently with a tool or fingernail.

Peeling: loss of the surface layer of stone, and the natural next step after blistering. The term "spalling" may be used where the thickness of the loss is somewhat greater. The surface area of the underlying stone is always greater than what has come away, increasing the rate of deterioration. See Photo 12 which shows the location of this detail image. Once the surface peels off, the stone beneath begins to erode.

Erosion was observed principally in two different types of locations: climbing and handling surfaces and areas of loss. Many of the upward-facing surfaces of the sculpture at the back show evidence of erosion. Historically the sculpture was not fenced, allowing access for climbing.[7] Surfaces inside the boat and the top of the head and other horizontal surfaces of the rear sculpure group all show signs of erosion of the stone from this type of activity.

The balance of the surface deterioration observed at the sculpture is due to a cycle of hairline cracking followed by blistering and peeling and then erosion from long-term weathering. The cycle is accelerated at locations where the stone is able to wick up water, such as at the intersection of the rear sculpture group with the boat (where water collects because the drainage holes are likely perpetually clogged as they were during my site visit, Photo 24), along the base of the boat (Photo 12), and at the base of the sculpture (Photos 12, 25). Deterioration from weathering is exacerbated where water flows over a patched surface and then onto an area of surface loss and salts extracted from the patch are redeposited into the weathered stone (Photo 26); salt-laden water also wicks up from patches.

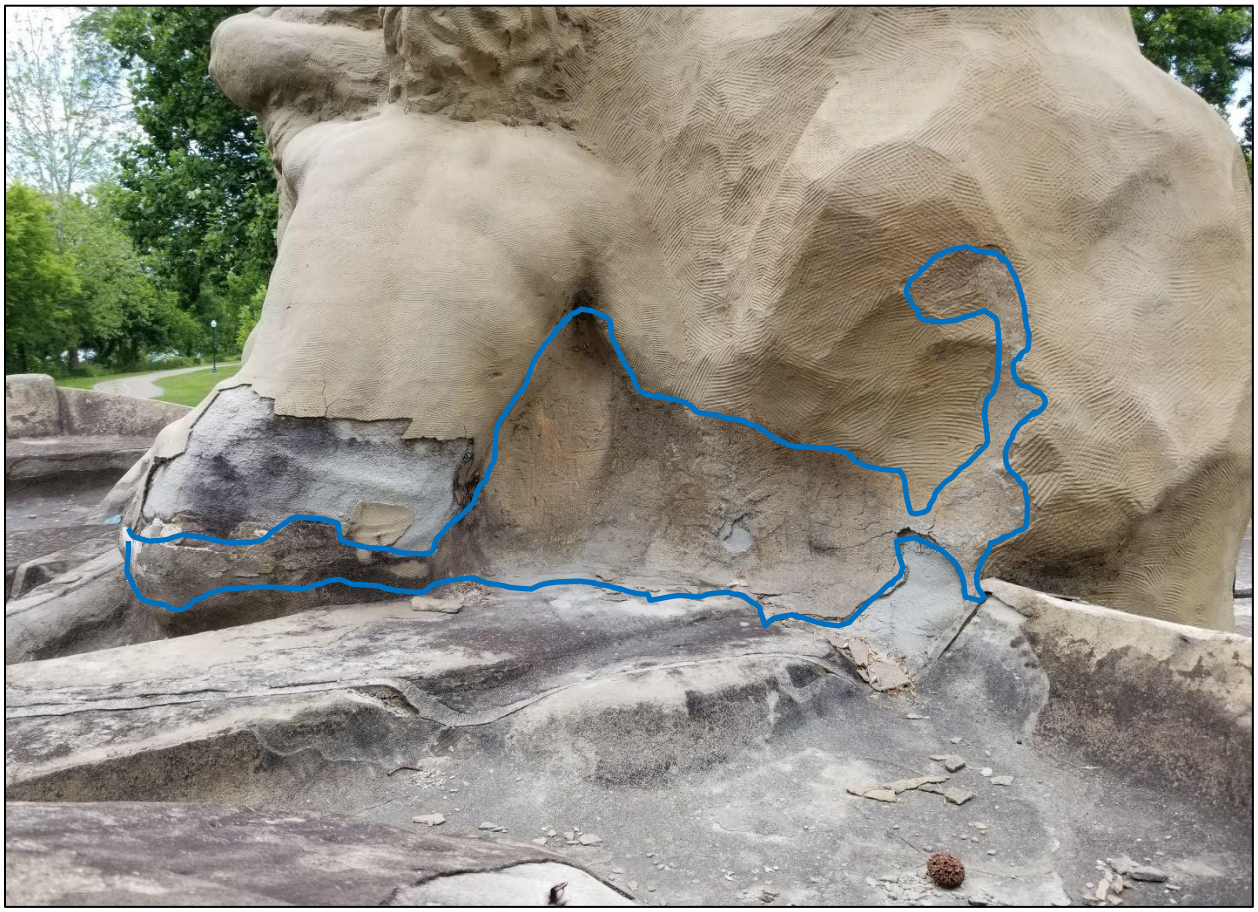


Photo 24: Detail of the intersection of the rear sculpture group with the boat showing the cracking, blistering, and peeling of the surface and previous patch repairs (outlined roughly in blue) indicating this is has been an ongoing problem. The thickness of the stone surface loss at the figure is approximately ¼ inch. The previously applied patch repairs are also peeling away because the material was applied too thinly and not mechanically keyed.

[7] During my site visit, one passerby in the park commented that he remembered climbing on the sculpture as a child.

Photo 25: Detail of the west elevation of the base in raking light showing the extent of the surface deterioration.

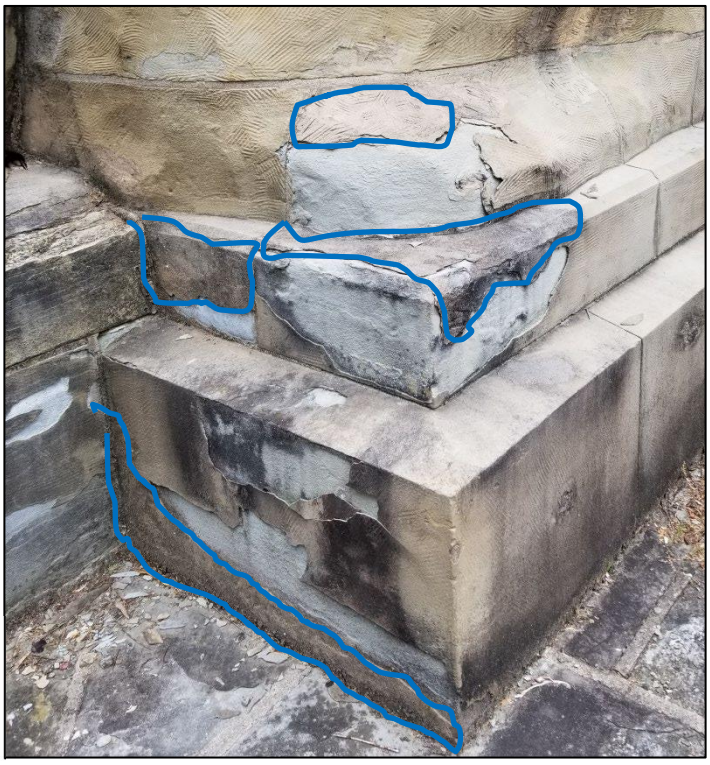


Photo 26: Detail of the southeast corner of the sculpture showing deterioration related to patching. The patches are roughly outlined in blue.

The deterioration process of hairline cracking-blistering-peeling has its roots in a difference between the physical characteristics of the stone at the very surface of the sculpture and the underlying stone. When the surface layer is denser than the underlying stone, any water or soluble salts making its way into the underlying stone is trapped rather than evaporating or being washed away. Water either will freeze and thaw or expand and contract in response to heating and cooling depending upon ambient temperatures. Salts crystallize and then dissolve back into solution as the stone wets and dries. The accumulation of these small mechanical stresses causes the dense superficial stone, which acts almost like a thick, coherent film, to first crack. The cracks allow in more moisture, accelerating the process of deterioration at the point of cracking which causes a blister to form. The process of separation continues, and ultimately the separated surface falls away, exposing the underlying stone to erosion.

One of the causes of surface densification of stone appears to be from tooling during the original carving of the stone. The other, more significant cause is any treatment of the stone that blocks the surface porosity, including preservative and water repellent treatments. The sculpture has had possibly as many as three surface treatments since it was installed in 1938. Micro water drop testing on small samples of peeled stone under the microscope reveal that the exterior, exposed surface of the stone is significantly less absorbent than the interior, unexposed surface. Some tests even showed minor water beading, suggesting the exposed surface is actually slightly water repellent in some locations. The contribution of patch repairs to the deterioration process, already described, has been extensive and worsens the ongoing problems.

Delamination

Delamination is a process distinct from blistering and peeling in that the locus of the deterioration is existing geologic structures in the stone. Sandstones are formed by particles settling out from suspension in water, usually flowing water. Variation in particle size creates layers having different properties (Photo 27). One of the primary differences between layers is often absorption—most sandstones are more absorbent (and permeable) parallel to the stone bedding than perpendicular. So, when the bedding of the sandstone is exposed, depending on the placement and character of the stone and beds, the freeze-thaw

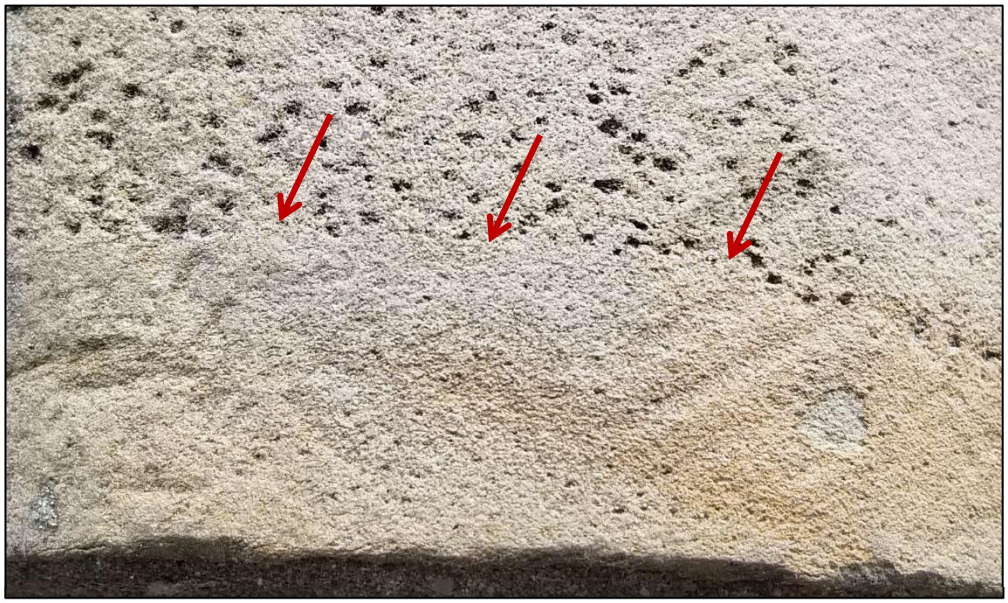


Photo 27: Bedding in the sculpture sandstone. West side, along bottom of coat of north figure.

and wet-dry cycles will start to cause a separation or delamination of the stone along the bedding. If the stone is restrained, there may only be erosion along the bedding planes (Photo 12, 25). However, if one face of the delaminating stone is exposed at the surface, the end result is much like peeling, with pieces of stone coming away from the surface. Delamination tends to cause loss of pieces of stone larger than those produced by peeling. Like peeling, delamination can be found by tapping or "sounding" the stone with a tool—a hollow sound reveals a separation. Delamination was observed at the water surrounding the base of the boat. As previously noted, the water is a thin piece of stone; it is also heavily patched. Sounding the water around the base of the boat revealed extensive delamination of the entire element. Localized probing confirmed that the delamination is not only of detached patches but also of the stone of the water itself.

Surface soiling

Two types of surface soiling were noted: general accumulation of debris and biological growth. Debris on the sculpture ranges from large particles and flakes of stone that have peeled and spalled off the surface to localized accumulations of dirt deposited as rainwater flows over the surface. The biggest problem with the debris accumulation is that it clogs the drainage holes in the boat, allowing water to accumulate which causes damage.

Organisms grow on the semi-porous stone surface because it provides a source of food and water. The biological soiling on the sculpture is obvious and pronounced; it is visible everywhere water sits or flows. In fact, virtually all of the soiling on the sculpture is biological. Biological growth is the dark discoloration covering the base (Photos 12, 25, 26), the greyish discoloration of the upward-facing surfaces inside the boat (Photo 5), and the purple streaks on the north-facing back of the kneeling figure in the boat and the joint between the center and north figures (Photo 13).

Research has demonstrated that biological growths on surfaces form a biofilm; an assortment of organisms connected to each other in a layer of organic material created by them. The film-forming character of biological growths makes it difficult if not impossible to remove completely; the individual organisms themselves may be removed, but the film is highly resistant and so remains facilitating recolonization. Removing all varieties of growth is also difficult; every cleaning method leaves behind some remnant that is resistant to that method. And, as with bacterial infections, repeated treatment can create resistant species.

One puzzling aspect of the appearance of the sculpture is the difference between the east and west portions. The eastern portion seems much cleaner and is largely free of biological growth relative to the west portion, and particularly relative to the base (compare Photos 1 and 4).

Conditions of the construction

Structurally the sculpture seems sound. The largest concern is the need for repointing; the vast majority of the joints between the base stones have either deteriorated mortar or are empty entirely of mortar. Weeds were observed growing out of the joints in many locations.

Conservation Options

During and after the assessment of the sculpture three primary options have been discussed for conservation of the sculpture. These include:

1. No Action
2. Conservation In-Place

3. Relocation Indoors.

The scope and expected outcomes for these options are presented below:

1. **No Action:** Leave the stone sculpture in-place under cover but take no other action. The consequences of this would be:
    a. Continued deterioration of the stone, albeit at a slower rate. There is no way of predicting the rate of deterioration.
    b. Additional changes to the appearance of the stone as water washing is prevented and the stone is shaded. Dirt will slowly accumulate on the surface, and the reduction in both lighting and moisture will affect the biofilm (reducing, increasing, or changing in appearance).
        i. The extent and character of these changes will not be fully understood until some time passes
        ii. Dirt accumulation could be addressed with periodic water rinsing.

    Estimated cost: Negligible

2. **Conservation In-Place:** Leave the sculpture in place under cover but perform a conservation treatment. The consequences of this would be:
    a. Appearance will be improved (somewhat for stabilization, significantly for restoration)
    b. Rate of deterioration will be slowed because conservation will help with keeping water out and away, but deterioration will continue. No treatment can stop the cracking-blistering-peeling cycle resulting from changes to the stone surface likely caused by previous sealer applications.
    c. There will be appearance changes from being under cover as described above.

    Stone conservation options are limited by previous treatments that have altered the surface composition and character of the stone of the sculpture, creating conditions that are now causing deterioration. Unfortunately, none of the previous treatments are fully reversible, and some (in particular the "sealer" treatments) are not reversible at all.

    Two broad levels of conservation include:
    - stabilization
    - restoration

    <u>Stabilization</u>
    A stabilization would entail only efforts to slow the deterioration of the sculpture; the appearance of the sculpture would be not changed very much. This approach is called stabilization because it would be intended slow the rate of deterioration. Remedial work would be directed towards limiting the negative effects of water by:
    - unclogging the drainage holes on the boat
    - repointing masonry joints (as deeply as required to fill the joints; very deep repointing may be needed, possibly even grouting)
    - removing loose and peeling patching
    - removing the patching at the joint between the "water" and the base and installing mortar
    - removing loose and peeling stone where it is collecting water and holding it against the underlying stone

    Cleaning is not recommended because of the tenacity of biological soiling—once removed, it quickly returns unless environmental conditions are changed; cleaning inevitably causes some

amount of stone loss and an increase in surface area (which can increase the rate of deterioration). The planned installation of a shelter fits nicely with a stabilization approach.

Restoration

Restoration would include not only all the steps of a stabilization but also steps to restore the appearance of the sculpture. Steps in a restoration program would include:

- unclogging the drainage holes on the boat
- repointing masonry joints (as deeply as required to fill the joints; very deep repointing may be needed, possibly even grouting)
- removing the patching at the joint between the "water" and the base and installing mortar
- removing loose and peeling patching and stone and patching with a product designed specifically for exterior stone
- removing the bright orange discoloration and other surface accretions using a suitable micro-abrasive process
- cleaning to remove biological growths and debris to prepare for patching

In the twenty plus years since work was last done on the sculpture there have been improvements in stone repair materials. There are now patching materials for stone without organic polymers that can be applied as thinly as 3/16 inch. If losses are thinner, the patching mortar is allowed to cure and then carved back. Identifying an appropriate patching material should be done by testing the properties of the stone (total water absorption, capillary absorption, and water vapor permeability) and the proposed mortar to ensure the physical properties of the materials match. Patching products incorporating Portland cement should not be used.

Some cleaning will be needed under this approach to help prepare surfaces for repair and to remove debris from the repair process. Only the gentlest means possible should be used; gentle methods of applying chemical disinfectants can be effective but take time for the cleaning effects to develop. Strong bases (bleach, swimming pool "shock") and acids should not be used. Note that the biological growths will return relatively quickly (in as little as 5 years and possibly sooner) even if chemical disinfectants are used.

Estimated Cost: Development of a cost estimate was not included in this project, so a previous estimate from 2003 (see Appendix A) was escalated in an attempt to develop a ball-park estimate for a total restoration. The estimate, provided by McKay Lodge in 2003 for a scope of work similar to that outlined in the "Restoration" option above, was approximately $15,000. Using an escalation factor of 200%, a current (2020) ball-park cost would be $50,000.00 The actual cost could be considerably more-***the only sure way of obtaining an accurate cost would be to bid the work..***

3. **Relocation Indoors:** Move the sculpture into a controlled environment (meaning a space that is has a controlled temperature, ventilation, and protection from UV). The consequences of this would be:
    a. Rate of deterioration will be virtually stopped
    b. Assuming the sculpture is restored, the appearance would be improved; regular (dry) cleaning would be required.

Relocation indoors would also allow for restoration of the sculpture using treatments that could not be recommended when the sculpture is exposed outdoors (consolidation, reattachment of some of the scaling stone with adhesive). Note that a period of stabilization and equilibration of

the sculpture with the new environment is strongly recommended before any conservation work is done.

Steps in relocation would include:

- Identify and document all the different stones in the sculpture. Removal of repair materials and mortar and probing the joints should answer most questions about how the sculpture is put together. Radiography may be needed if there is a suspicion that parts of the sculpture are joined together with metal pins and this cannot be confirmed simply by probing.
- Use the laser scan point cloud data to create a 3D model of the sculpture. Develop a numbering system and record a number and position for each unit.
- Hire a conservator experienced with moving sculpture to work with a rigging company to develop a plan for disassembling and moving the sculpture. The sculpture may not need to be completely disassembled; there may be distinct advantages to limiting the disassembly. A masonry restoration firm may also need to be involved.

Relocating the sculpture is an option that should not be taken lightly even with the goal of protecting it from deterioration. There are a number of concerns that should be given serious thought before taking this significant step.

1. The stone sculpture in its current location is an irreplaceable record of a time and place, and a significant testimony to the men who created the sculpture. The stone sculpture tells a story about the time, circumstance, and place of creation that would be lost if it were removed and replaced with a substitute, particularly a substitute in a material other than the local stone.
2. Once moved inside, the sculpture becomes less accessible.
3. The process of relocating the sculpture could cause irreversible damage from accidental impacts causing breakage. If elements were dropped during lifting or transport, they could be completely destroyed.
4. Because we do not know for certain the materials and methods used for previous interventions, the treated surface of the sculpture may react poorly to the new environmental conditions to which it is subjected resulting in unexpected types of deterioration (chances of this would be mitigated by additional analysis and testing of the existing materials).

Guidelines for Implementation

Regardless of the option adopted for the preservation of the sculpture, having properly trained and qualified conservators, craftsmen, and contractors involved is critical to achieving a successful outcome for the project. There are two fundamental steps involved:

- Test the stone
- Decide how the project will be designed and implemented

Before any conservation work is done, additional more detailed study of the stone is recommended. The mineralogical composition and physical properties (capillarity, total absorption, and permeability at minimum; strength as required to facilitate relocation) should be determined for the unaltered stone. Analysis of the peeling stone for these properties would also be extremely useful. Examination of the peeling surface stone in comparison to the unaltered underlying stone via thin-section petrography at minimum, and ideally also with scanning electron microscopy is recommended to confirm the suspected

deterioration mechanism. This proposed program of analysis will require a minimal number of small samples that can be taken at existing areas of damage.

For any actual conservation work on the sculpture, a model based on architectural practice is strongly recommended, In this model, a consulting professional conservator serves the client on the design side, bringing the benefit of their technical knowledge to the project and acting as the client representative. The consulting conservator would:

- develop construction documents for the work,
- identify firms capable of doing the work
- assist in obtaining and evaluating bids for the work
- provide construction observation for the purposes of quality control

Unlike a traditional construction project where the architect develops prescriptive drawings and specifications, the construction documents developed by the consulting conservator are intended more to guide the philosophy of the work, providing recommendations for products and procedures. The conservator hired for the conservation of the sculpture will then develop a treatment proposal, which will be evaluated by the consulting conservator prior to implementation of the work. The sculpture conservator will be expected to provide before and after treatment photo documentation and an after-treatment report documenting the materials and methods actually used in the work, and will also be responsible for hiring subcontractors as required (e.g. masons to assist with repointing; riggers if needed to move the sculpture).

The qualifications of the conservators involved in the project will be crucial to the outcome of the work. Experience with the conservation of sandstone in particular (not just stone in general) is essential for a good outcome of the project. Willingness of the conservator to include a masonry restoration contractor on their team could be important in controlling project costs. Any conservator involved at any level in the project should be a professional member of the American Institute for Conservation because of the requirement that they abide by a strict Code of Ethics.

PYLONS

Description

The four pylons, two at each end of Muskingum Park on either side of Front Street are essentially identical in construction (there is a slight difference between the pylons at the north and south ends of the park, Photos 28, 29). Each is a rectangular column with battered sides. Each column consists of six elements: a profiled base stone, a single bottom stone, a pair of middle stones, a single top stone, a top profiled stone and the carved eagle stone cap (the head of each eagle also seems to be a separate piece of stone). The corners of the column are chamfered, and there are three stars in relief at all four sides of the top block. A different inscription is carved into the middle of each column on the elevation facing away from the park; the words “Erected in 1938 by act of Congress of the United States of America” are carved on the face opposite the inscription on one of each pair of pylons.

Observations

The condition of each pylon (and each face of each pylon) is slightly different. However, all four pylons show the same general types of deterioration, most of which were observed on the sculpture and have been described earlier in this report including:

- blistering and peeling of the surface
- delamination
- biological soiling

Two additional conditions observed at the pylons were impact damage and damage from previous treatments. Most of the mortar joints in the pylons are deteriorated, though few are open, suggesting the need for repointing in the near future.

Southwest Pylon

The southwest pylon is closest to the bridge and river, and just at the entrance to the parking lot at the south end of the park (Photo 28). The most significant condition of the southwest pylon is the deterioration of the eagle sculpture. The surface of the stone at the head and the top and back of the wings is blistering and peeling; stone at areas of loss at the front are eroding (Photos 31, 32). There is biological growth on the sculpture and the upper blocks of the column, but primarily on the north and east sides (Photos 32, 33). The base is also soiled and there are losses from impacts and from peeling. Salting of the sidewalks and the roads has certainly played a role in the condition of the base. There is a large loss at the bottom block at the northwest corner that is almost certainly from impact (Photo 33); bollards have been installed at the northwest and northeast corners to protect the pylon. Finally, there is distinct damage from previous treatments. There is a graffiti "ghost" at the north elevation (Photo 33) left from damage caused by the removal, and at the east elevation there is streaking from a previous cleaning (Photo 34).

Southeast Pylon

The condition of the southeast pylon is considerably poorer than that of its counterpart across the street. There is blistering and peeling of the stone at various locations at all four elevations (Photos 35-38); the top and bottom profile blocks are in uniformly poor condition. The blistering and peeling at the south elevation is threatening the inscription (Photo 36). There is also blistering, peeling, and stone loss at both the front and back of the eagle sculpture similar to that observed across the street (Photos 39, 40). All elevations except the west have significant biological growth near the top and at the bottom profile block.

The blistering and peeling on the west elevation appears to be associated with a previous attempt to remove graffiti; there is also visible damage from power washing on the east elevation (Photo 37).

Northwest Pylon

The northeast pylon is in significantly better condition than either of the south pylons. Biological growth is pronounced principally at the north elevation (Photo 41), with less significant accumulations at the top and bottom profile blocks at other elevations. There is some deterioration of the stone of the eagle sculpture, principally at the base of the east wing at the rear (south) elevation (Photo 42) and at the base of the west wing at the front (north elevation). However, the significant blistering and peeling observed at the sculptures on the south pylons is absent. Delamination of along the bottom edge of the top profile block and the top of the upper column block was observed at the south and west elevations (Photo 42); where the bottom profile block is exposed it is peeling. The east and west elevations also shows signs of a previous treatment in the form of streaks (Photo 43). There is physical damage associated with the streaking on the west elevation, providing substantiation of the likelihood of an acid treatment of some type.

Northeast Pylon

The northeast pylon has heavy accumulations of biological growth on the north, east, and south elevations, particularly near the top; the eagle is heavily encrusted with lichen (Photos 29, 44). Stone loss is comparatively limited, with signs of old peeling at the top profile block at the east elevation (Photo 44). Delamination at the bottom of the top profile block has caused a loss at the west elevation; there is also a larger impact loss at the southeast corner of the bottom block (Photo 45). The impact damage also

includes several deep scratches and paint residues on the east elevation. The bottom profile block has peeled, with associated surface loss of stone; there is also fairly heavy biological growth on the bottom profile block.

Conservation Options

Although no documentation was provided about previous treatment of the pylons, the existing conditions suggest that they may also have had surface treatments in the past which, like the sculpture, would complicate future treatments. The two options for the pylons are minimal intervention/stabilization or conservation in-place. The condition of the pylons does not suggest the need for relocation at this time.

Stabilization

As with the sculpture, the objective of a stabilization would be to slow deterioration primarily by improving water movement over the stone and would be limited to removing peeling stone where it is holding water. Removing all the peeling stone is not recommended because that could accelerate the deterioration of the underlying stone without additional treatment. As with the sculpture, cleaning is not recommended for a stabilization.

One step that could help preserve the pylons (based on evidence of previous damage) would be installation of protective bollards. Bollards have already been installed at the north side of the southwest bollard; their installation could be recommended around all four pylons. At minimum, bollards installed on the side facing oncoming traffic (the south side for the east pylons; the north side for the west ones) could be expected to provide protection against future impact damage. The bollards would be less noticeable if they were painted a color similar to that of the stone.

Restoration

Restoration would involve efforts to restore the appearance of the sculpture. Steps in a restoration program would include:

- removing peeling stone at areas other than the eagles and treating the surfaces to reduce the appearance of peeling through honing
- repointing masonry joints
- restoring profiles at the top of the pylons and eagle sculpture where stone has been lost with a patching mortar designed specifically for exterior stone (repair of the bottom profile blocks is not recommended because of their assumed ongoing exposure to deicing salts)
- cleaning followed by implementation of passive controls to prevent re-occurrence of biological growth

Because of the configuration of the pylons, it may be possible to control some of the biological growth by installing metal in the horizontal joints at the base of the eagle and the base of the top profile block. Both zinc and copper have been used in this way to prevent re-growth on previously cleaned surfaces. The method works because water flowing over the metal releases small amounts of metal ions that make the substrate toxic to biological growths.

As with conservation of the sculpture, the patching mortar needs to be matched to the properties of the stone of the pylons. Considering that the pylons and sculpture were created from stone from the same quarry, and compatibility study for patching mortar done for the sculpture would be applicable to the pylons also. Cleaners containing strong bases should not be used; only cleaners containing quaternary ammonium compounds are recommended.

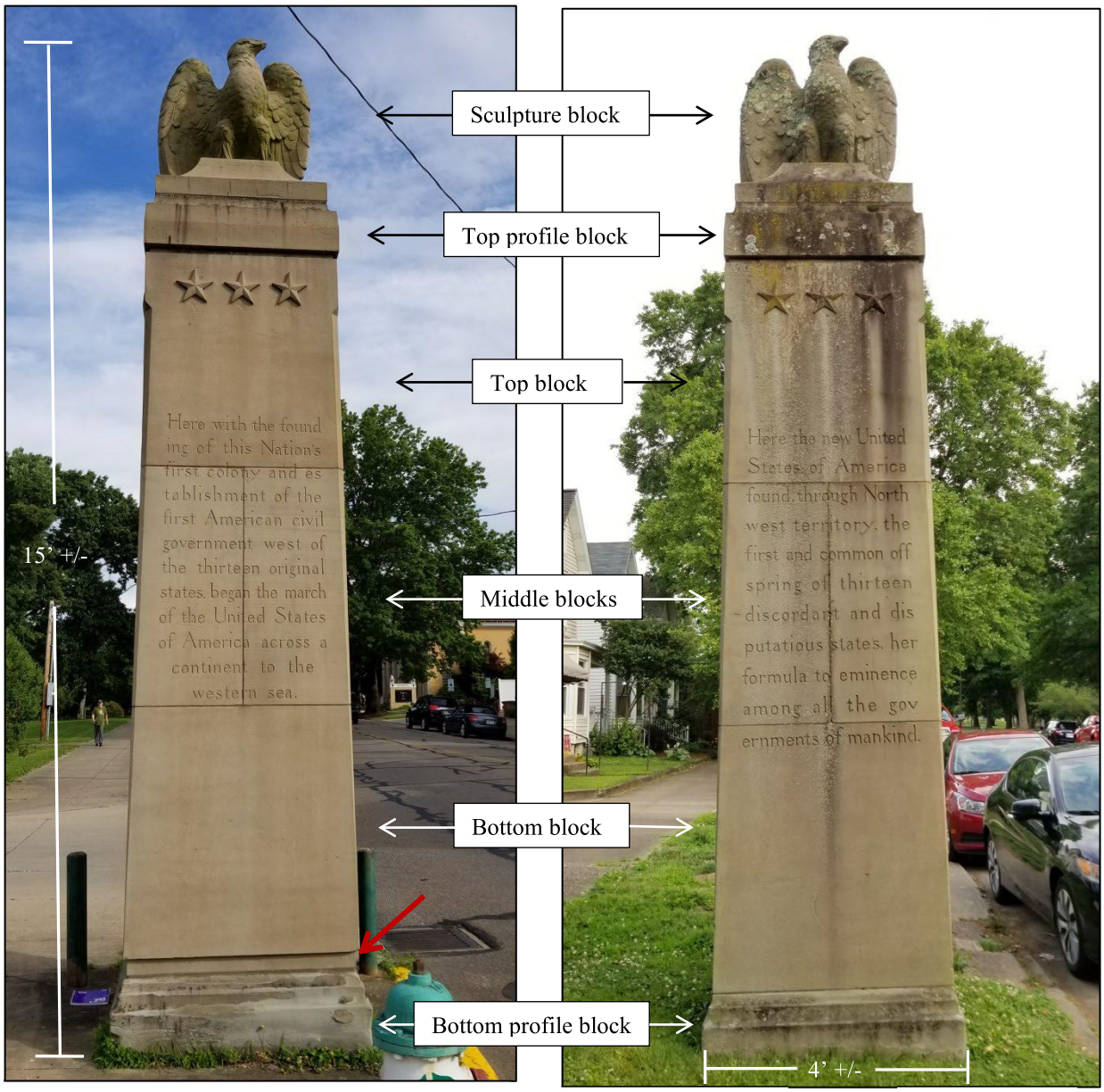


Photo 28: Southwest pylon, south elevation, corner of Front and Putnam streets. Note the slight recess at the bottom of the bottom-center block (red arrow).

Photo 29: Northeast pylon, north elevation. Note the absence of the slight recess at the bottom of the bottom-center block-compare to Photo 28. This pylon is heavily coated with lichen, particularly on the eagle.

Photo 30: Detail of the eagle at the northwest pylon, west elevation. Note the joint at just below the beak showing the head is a separate piece of stone (red arrow). The stone deterioration at the bottom of the right wing and between the legs is typical; similar deterioration is often seen at the back of the eagle on the wings. The streaky purple material is biological growth. Note the wide joint between the sculpture block and the top profile block (green arrow).

Photo 31: Detail of the eagle at the southwest pylon, south elevation. Note the peeling stone at the head and tops of the wings and the stone loss at the bottom of the wings. The green is biological growth, as are the streaks of purple. Note the wide joint between the sculpture block and the top profile block.

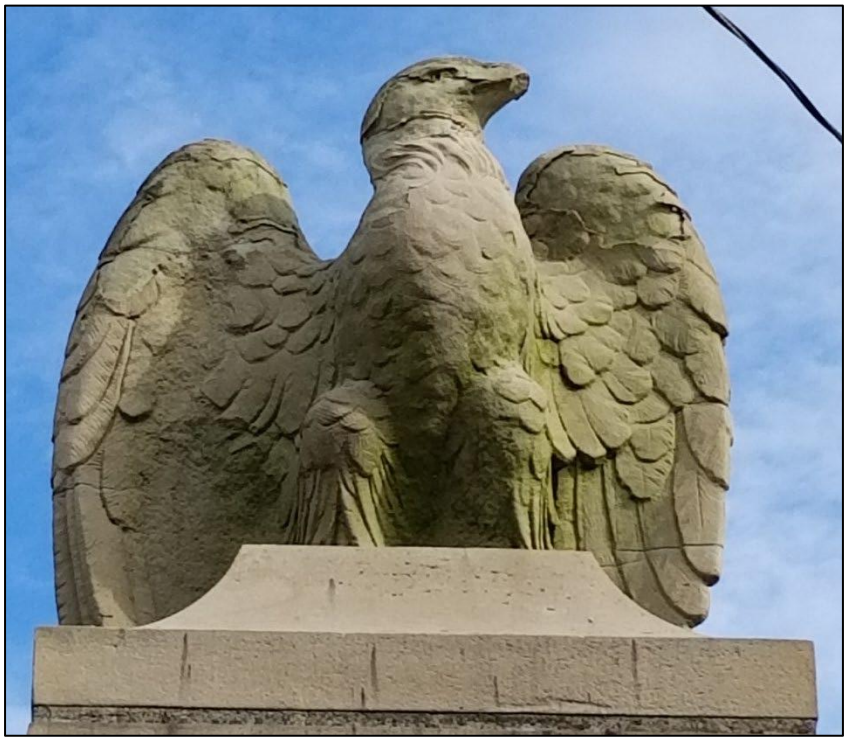


Photo 32: Detail of the rear of the eagle at the southwest pylon, north elevation. Note the peeling stone at the head and tops of the wings. The green is biological growth, as are the streaks of purple. The delamination of the top profile block is clearly visible (red arrows).

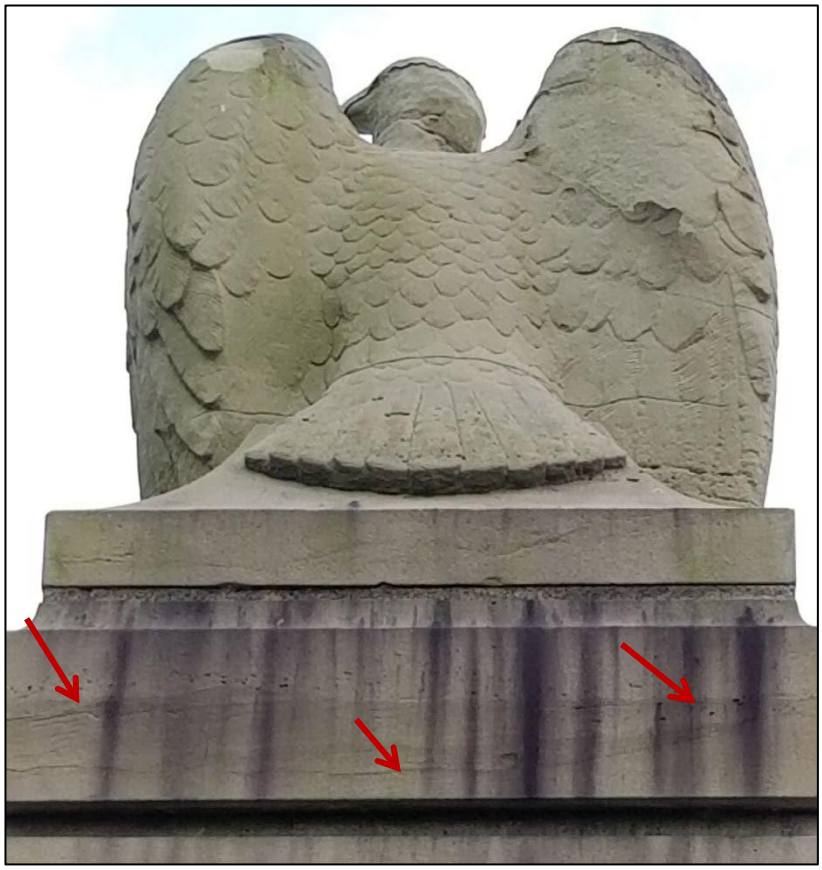


Photo 33: Overall view of the north elevation of the southwest pylon. The green on the eagle is biological growth, as are the streaks of purple—this is the most pronounced biological soiling on this pylon with the exception of the base. This view shows evidence of a previous graffiti removal effort (circled), and also impact damage near the base (arrows). The bollards were likely installed after the damage.

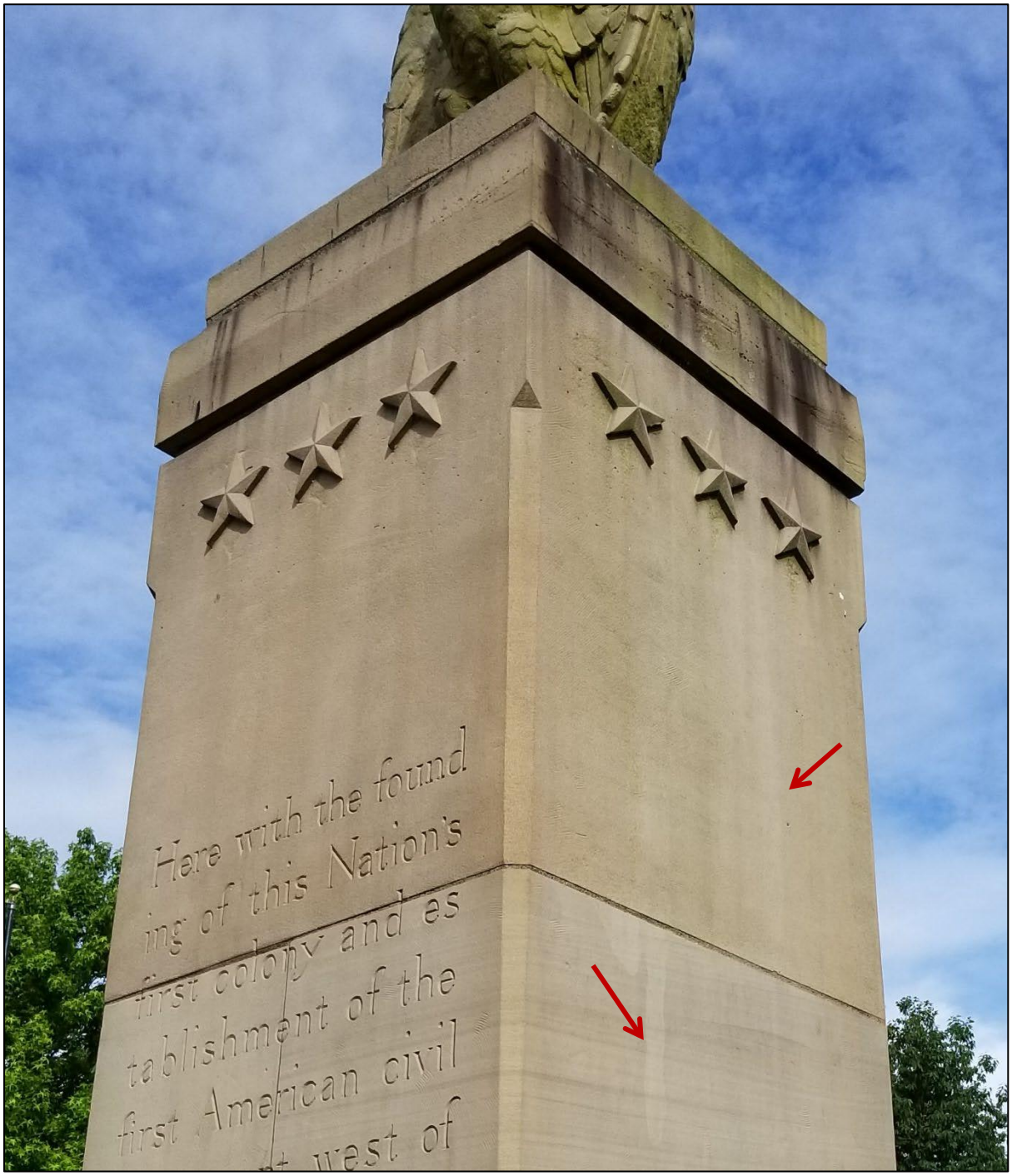


Photo 34: Detail of the southeast corner of the southwest pylon. The white streaks on the east elevation are distinct evidence of a previous cleaning, possibly with an acidic material. Many products sold for cleaning sandstone and granite are acidic, and require careful dilution and application as they can easily cause this kind of discoloration.

Photo 35: View of the southeast corner of the southeast pylon. There is readily visible blistering and peeling of the middle blocks at the south elevation, and of the top block at the east elevation (red circles). Similar deterioration at the profile block is harder to read in the image. Note also the peeling and erosion of the bottom profile block. The pronounced biological soiling is typical of all elevations of this pylon except the west.

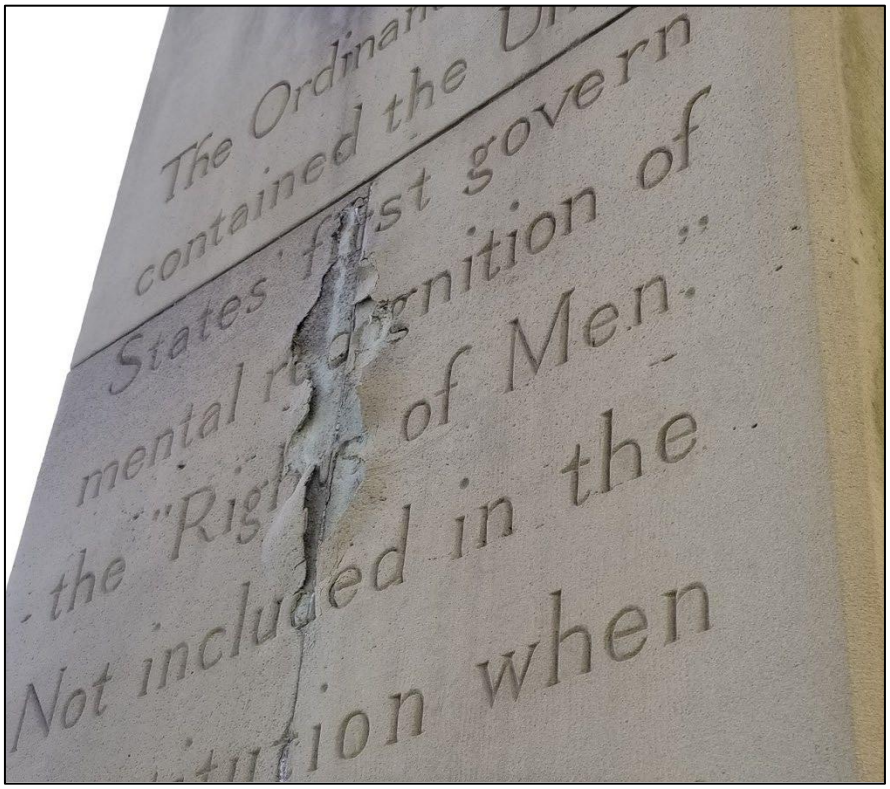


Photo 36: Detail of the southeast corner of the southeast pylon. There is readily visible blistering and peeling of the middle blocks at the south elevation, and of the top block at the east elevation. Similar deterioration at the profile block is harder to read. Note also the peeling and erosion of the bottom profile block.

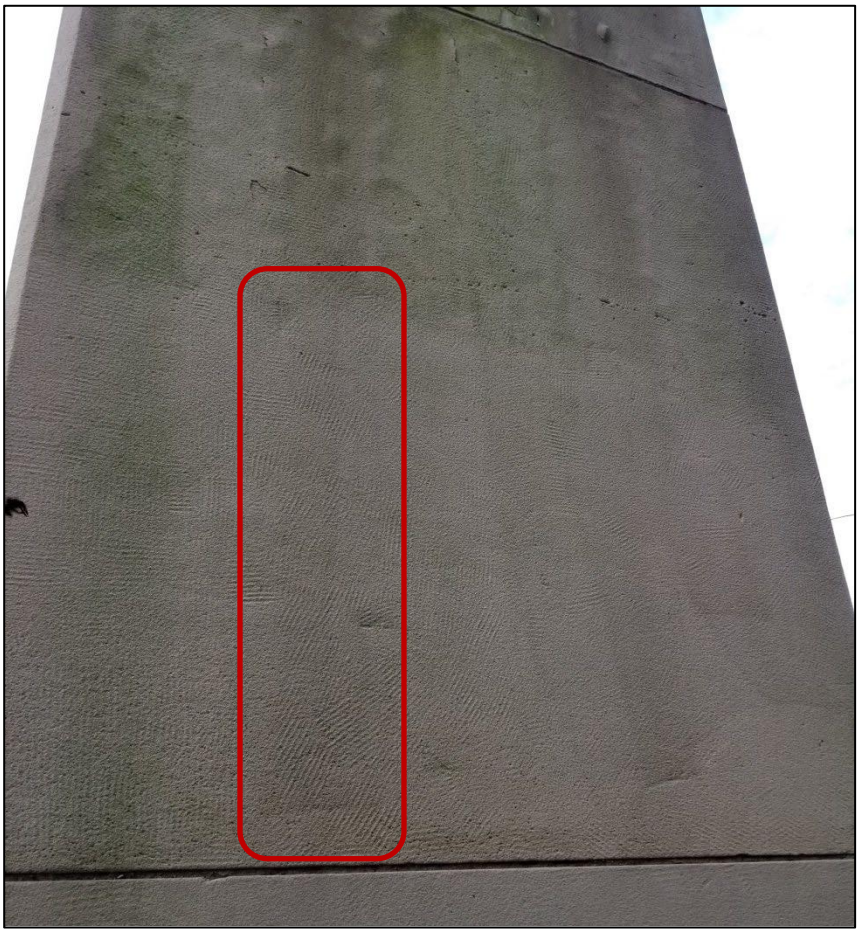


Photo 37: Detail of the east elevation of the southeast pylon. Note the blistering and peeling and green biological growth. There is also evidence of damage from power washing in the form of streaks with a line at the end (red rectangle).

Photo 38: View of the northwest corner of the southeast pylon. The areas of blistering and peeling both seem to be associated at areas of previous graffiti removal. Note also the blistering and peeling at the top and bottom profile blocks.

Photo 39: View of the front (south) side of the eagle sculpture on the southeast pylon. Note the deterioration on the top of the wing and the head, and also at the body and wing. Note also the biological growth, blistering, and peeling on the base of the sculpture block and the top profile block

Photo 40: View of the back (north) side of the eagle sculpture on the southeast pylon. Note the deterioration on the top of the wing. Note also the biological growth, blistering, and peeling on the base of the sculpture block and the top profile block

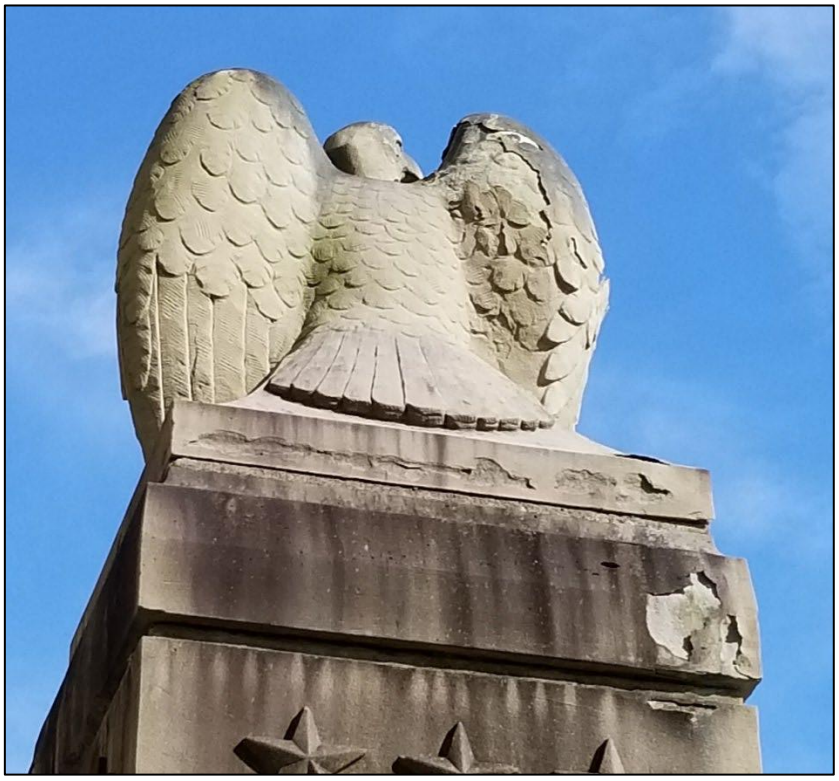
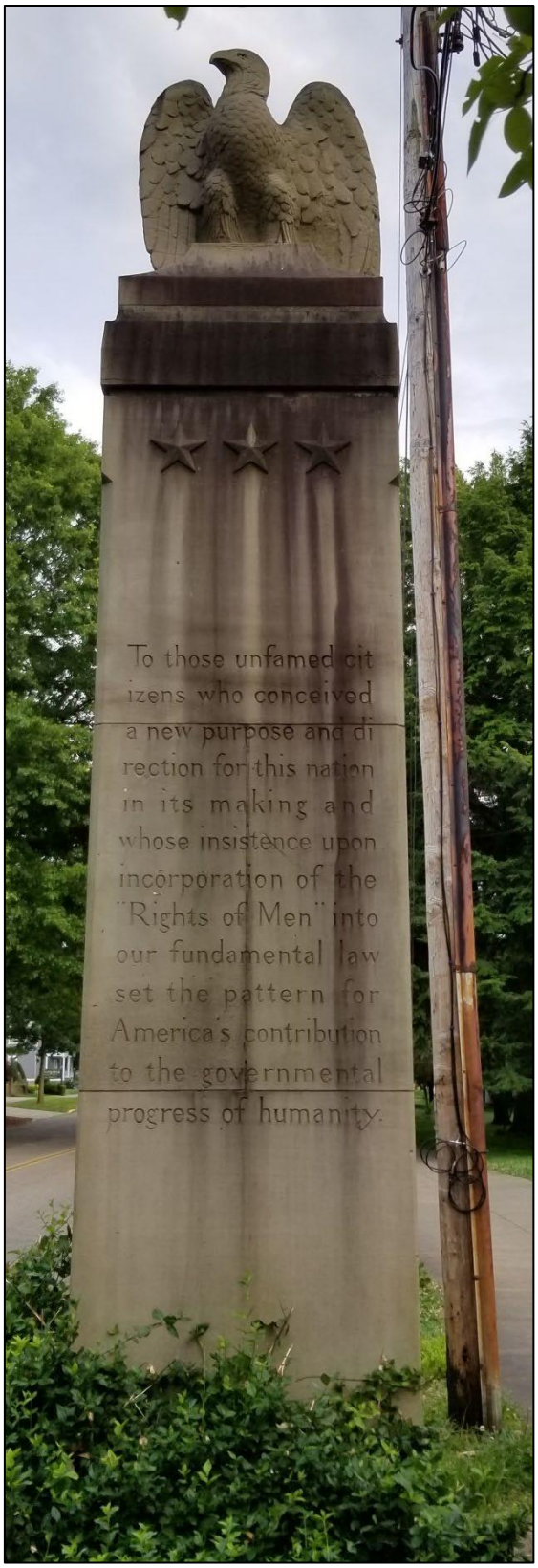


Photo 41: View of the north elevation of the northwest pylon. The plants completely cover the bottom profile block at this and the east elevation. Note the heavy biological growth which is most extensive at this elevation.



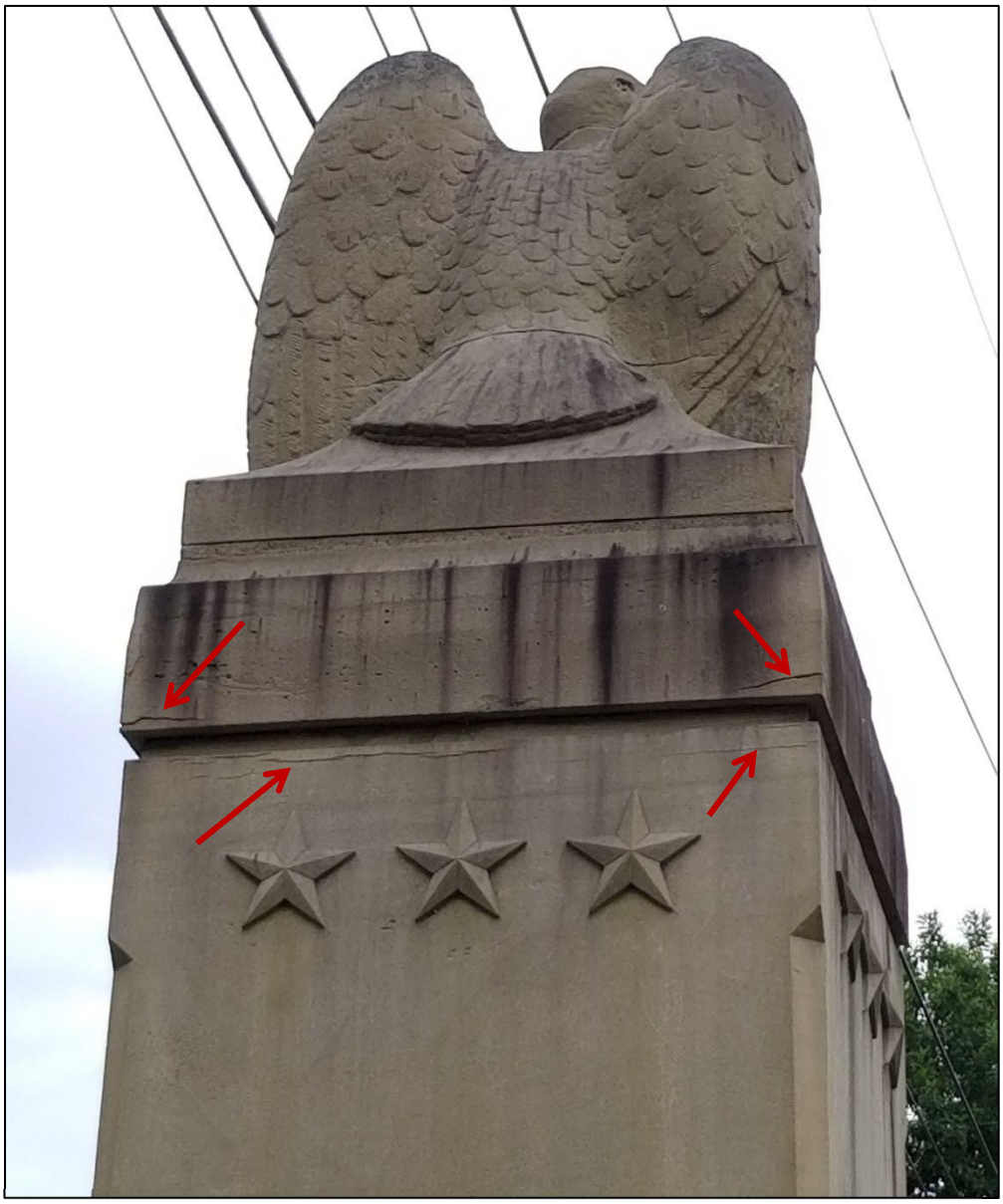


Photo 42: Detail of the south elevation of the northwest pylon showing the relatively minor stone deterioration at the sculpture. The degree of biological growth at the top profile block at this elevation is typical. Note also the delamination at the bottom of the top profile block and the top of the upper column block (arrows).

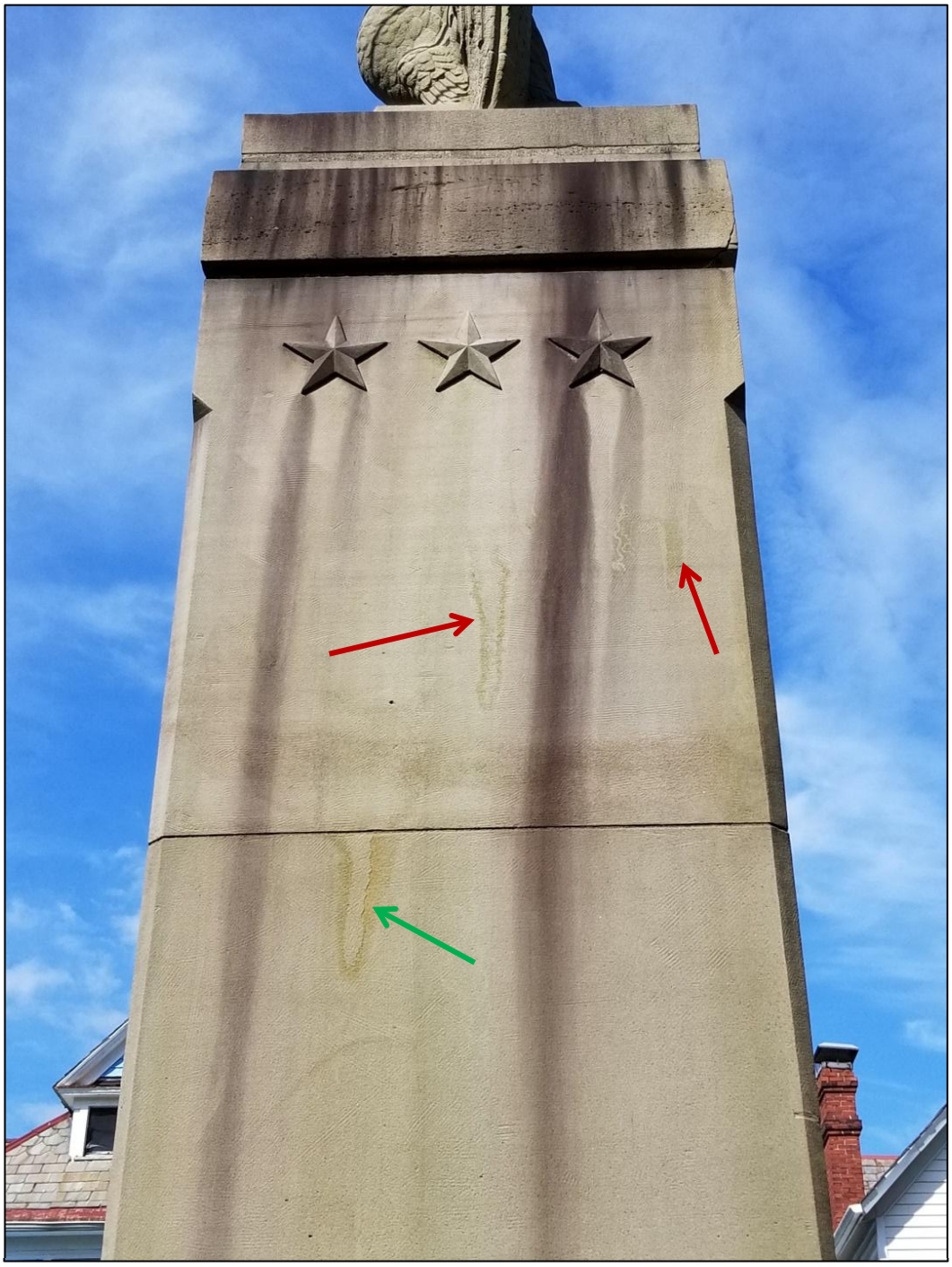
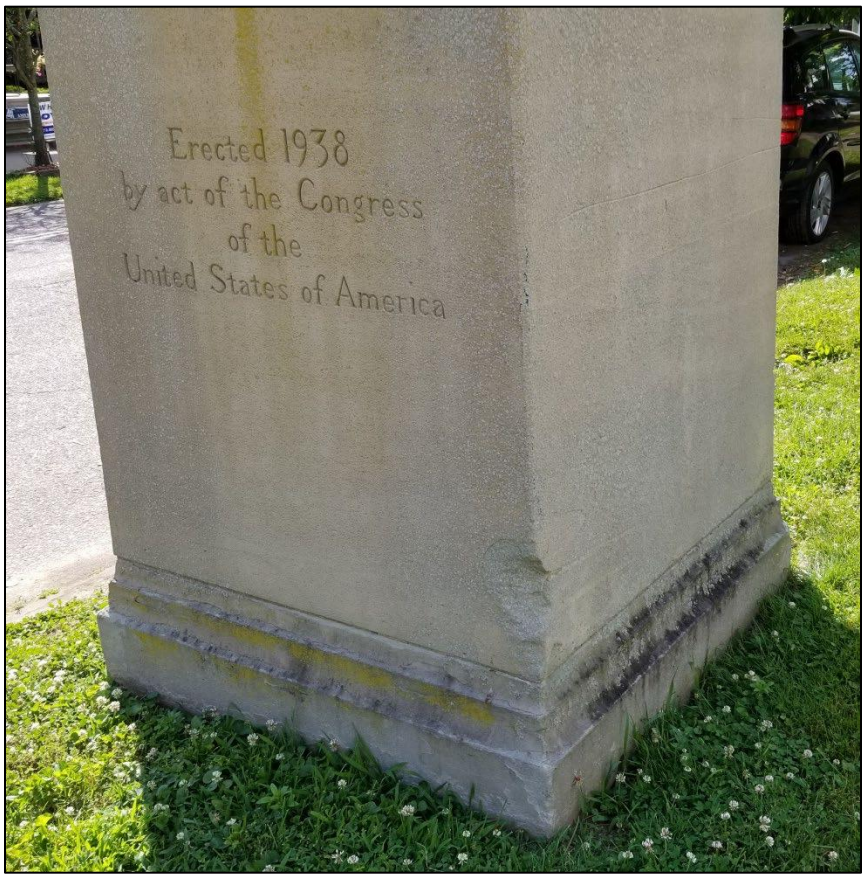


Photo 43: Detail of the west elevation of the northwest pylon showing streaking from a previous treatment (red arrows). At the green arrow, there is also stone erosion. The purple streaks are biological growth.

Photo 44: Detail of the east elevation of the northeast pylon showing the heavy accumulation of biological growth, particularly lichen.

Photo 45: Detail of the southeast of the northeast pylon showing the loss due to impact damage. Note also the biological growth on the bottom profile block, which has areas of peeling and loss.



CONCLUSION

The sculpture and pylons of the Memorial to the Start Westward have been given much well-intentioned attention since their installation in 1938. The next efforts to preserve these unique and significant elements need to rely more on science and less on good will if they are to be preserved for future generations. A slow, measured, conservative approach to their conservation is recommended. There is plenty of time.