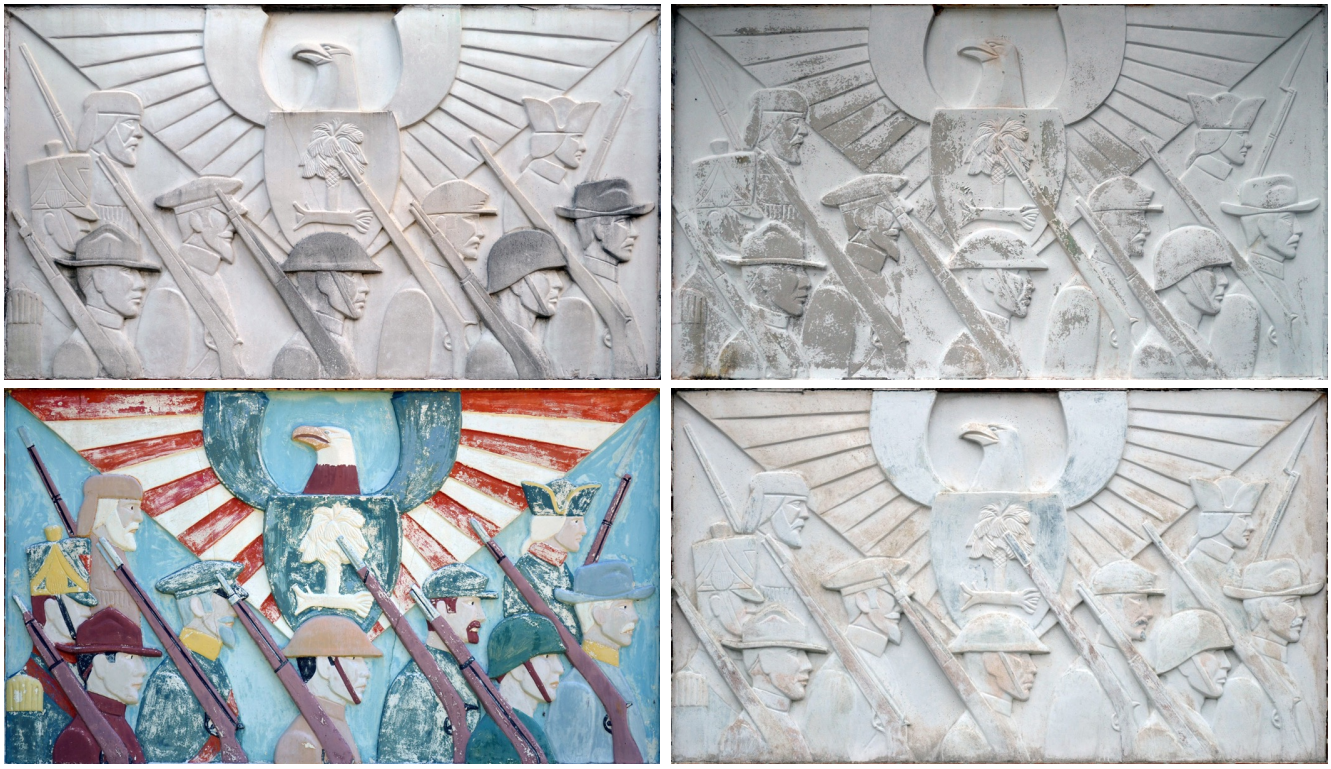
Maintenance Manual

for the Maintenance and Preservation of the Willard Hirsch Bas-Relief Panels Commemorating the History of the South Carolina Army National Guard



by

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Acknowledgments

This Maintenance Manual was developed as part of a larger mitigation plan established by the South Carolina Army National Guard (SCARNG) and the South Carolina Department of History and Archives (SCDHA) in response to the rehabilitation, closure, and deaccession of armories containing a Willard Hirsch panel. The process began in 2010 when Eric W. Plagg, PhD, an historian with the South Carolina Institute of Archaeology and Anthropology (SCIAA), evaluated and documented fifteen armories. Later, these armories were determined to be eligible for the National Register of Historic Places (NRHP). In response to the closure of four of these NRHP eligible facilities, SCARNG and SCIAA developed a mitigation plan that included an evaluation of the existing Willard Hirsch panels, in both public and private ownership. Karen Smith, PhD, an archaeologist with SCIAA, surveyed and documented forty-one panels throughout the state. Her documentation and report were completed in 2014 and provided the basis for the range of conditions addressed in this manual. As a result, this manual should be considered to be a continuation of the previous research and documentation of the Willard Hirsch panels.

Introduction

This Maintenance Manual is intended to serve as a reference manual for building owners and others responsible for the maintenance and preservation of one of the remaining Willard Hirsch *bas-relief* panels commemorating the history of the South Carolina Army National Guard (SCARNG). In 1953, Heyward S. Singley, the architect of a series of mid-twentieth century armory buildings throughout the state, commissioned Willard Hirsch to sculpt a *bas-relief* panel commemorating the history of the South Carolina Army National Guard. The original panel was produced in plaster and was used to cast a reusable mold (Moser 2016). The mold was intended to be used by a contractor to cast a panel for installation at each of the armory buildings using the same materials as the other cast-stone elements at each facility. The existing panels were installed at armory buildings constructed between 1953 and 1972 (Smith 2014).

This manual begins by describing the types of general conditions identified in the existing panels, including original condition, polychrome (painted in multiple colors), and

monochrome (painted in a single color). It then discusses the specific maintenance requirements for each of these general conditions. The manual then addresses the primary causes of decay and deterioration and the resulting conditions, including damage, staining, vegetation, and construction. Damage includes spalling, fractures, and surface pitting and erosion, which may have been caused by impacts, sandblasting, or weathering. Staining identified on the existing panels appears to be related to either iron oxides or cupric oxides deposited on the surface from iron or copper elements installed above the panels. Vegetation on or adjacent to the panels, including trees and bushes, climbing vegetation, and mold and mildew, can cause various forms of deterioration, which can lead to more significant damage, if it is not properly managed. Although construction may not have affected all of the existing panels, it is important to consider this potential cause of damage when planning future building maintenance or construction projects at each armory.

General Surface Conditions

Based on the 2014 survey, there are forty-one panels that have been surveyed and documented throughout the state. Four of these panels were covered with signage. As a result, this analysis of the conditions affecting the Willard Hirsch panels is based on a total of thirty-seven panels. Eleven panels (30%) are in their original condition, ten panels (27%) are polychromed, and sixteen (43%) have been monochromed (Smith 2014).

Although each of these general surface conditions will require slightly different maintenance, there are some general guidelines to follow for all of the existing panels. All maintenance should aim to cause no additional harm to the panels. It is preferable for the long-term preservation of these panels to remain slightly dirty or be negatively affected by a slow process of decay or deterioration than to be cleaned or treated in a way that damages the surface of the panel. Even if the appearance of the panel were temporarily improved, the surface damage could create a more hospitable environment for vegetation or allow water to infiltrate the surface and cause structural damage to the panel.

Methods and tools for cleaning and maintenance commonly used on other types of building materials that are **NOT APPROPRIATE** for use on the Willard Hirsch panels include:

1. Sandblasting, even when using softer abrasive materials such as corn cob or walnut shells
2. Pressure-washing, even when using the lowest pressure settings on the equipment or using a special low-pressure nozzle
3. Angle grinders, even when treating only the mortar or sealant joint around the panel, as these tools have a tendency to "get away" from the operator and cut into adjacent materials
4. Power sanders, including belt sanders, orbital sanders, finish sanders, and drum sanders
5. Rotary tools, including wire wheels, buffers, and arts and crafts tools
6. Metal hand tools that have the potential to damage the surface of the panel, including metal scrapers and wire brushes

The following is a list of cleaning and maintenance methods commonly used on other types of building materials that are **APPROPRIATE** for use on the Willard Hirsch panels. Only the gentlest effective method of cleaning should be employed to clean the panels. These methods should be tested in the following order:

1. Clean the surface with a stiff, natural bristle brush dipped in plain water, repeating as necessary
2. Clean the surface with a stiff, natural bristle brush dipped in a vinegar and water solution (1 cup of white vinegar to 1 gallon of clean water) and rinse thoroughly with plain water, repeating as necessary
3. Clean the surface with a stiff, natural bristle brush dipped in a diluted solution of clear, dishwashing liquid and water (1 teaspoon of dishwashing liquid to 1 gallon of clean water) and rinse thoroughly with plain water, repeating as necessary

The three general surface conditions identified in the 2014 survey will require slightly different maintenance procedures. These conditions and the procedures specific to each condition are described below.

Original

The panels that are in their original condition have an exposed-aggregate concrete surface. These panels are typically affected primarily by the adverse conditions detailed in the following section, including damage, staining, vegetation, and construction. Since these panels do not have a painted surface, they are potentially more susceptible to surface erosion and pitting than a panel with a painted surface.

Polychrome

The polychrome panels have a multi-colored surface that may have been painted with a lead-based oil paint or a more recent latex paint. The painted surfaces vary in condition throughout the set of ten panels of this type. If paint is actively flaking or delaminating, the building owner or others responsible for the maintenance and preservation of the panel should consider limited testing to determine whether or not the paint contains lead. If it is not a lead-based paint, loose paint can be gently removed with a stiff, natural-bristle brush. If it is a lead-based paint, the flaking and delaminating paint may need to be abated to prevent environmental contamination or hazardous conditions. Please note that lead-based paint abatement should only be completed by a qualified professional. Attempts to remove lead-based paint by abrading or scrubbing the surface can produce airborne particles, which can be inhaled or ingested and cause lead poisoning. Sandblasting should never be utilized in this situation, because it creates a fine dust that is extremely hazardous. It also has the potential to adversely affect the surface of the panel, which can alter the surface of the panel and accelerate weathering.

Monochrome

The monochrome panels have a single-colored surface that may have been painted with a lead-based oil paint or a more recent latex paint. The painted surface varies in

condition throughout the set of sixteen panels of this type. The monochrome painted surface may be applied directly to the original surface to cover staining or discoloration, or it may have been applied to cover a previously polychromed surface. A close inspection of the surface may reveal whether the panel has multiple coats of paint or not. Similar to the actively flaking or delaminating polychromed surfaces, the building owner or others responsible for the maintenance and preservation of the panel should consider limited testing to determine whether or not the paint contains lead. If it is not a lead-based paint, loose paint can be gently removed with a stiff, natural-bristle brush. If it is a lead-based paint, the flaking and delaminating paint may need to be abated to prevent environmental contamination or hazardous conditions. Please note that lead-based paint abatement should only be completed by a qualified professional. Attempts to remove lead-based paint by abrading or scrubbing the surface can produce airborne particles, which can be inhaled or ingested and cause lead poisoning. Sandblasting should never be utilized in this situation, because it creates a fine dust that is extremely hazardous. It also has the potential to adversely affect the surface of the panel, which can alter the surface of the panel and accelerate weathering.

Damage

The types of damage addressed in this section include spalling, fractures, and surface pitting and erosion. Spalling includes areas of the panel that have broken off in large pieces, often exposing the underlying reinforcing bars or rebar. Fractures include cracks varying in size from hairline cracks to large cracks that extend into the panel to the depth of the rebar or are associated with spalling. Surface pitting and erosion is the loss of surface material caused by water or wind and can occur in the form of pits or rounded holes in the surface or in the general loss of material across the surface that leaves the aggregate exposed in an elevated position.

Spalling

Spalling includes areas of the panel that have broken off in large pieces, often exposing the underlying rebar. The greatest concern with this type of damage is the exposure of the rebar. If the rebar is exposed, it accelerates the oxidation or rusting of this material, which causes the rebar to expand and break additional material off the surface of the panel. If a panel has exposed metal rebar, the condition should be addressed immediately. The building owner or others responsible for the maintenance and preservation of the panel should contact the SCARNG Cultural Resource Manager in the Environmental Office or an historic preservation specialist who can provide advice on the best way to arrest the oxidation or process of rusting and apply a coating that will prevent further exposure to water. This may be a coating applied to the metal surface or the restoration of this particular element using an appropriate mortar repair.

Fractures

Fractures include cracks varying in size from hairline cracks to large cracks that extend into the panel to the depth of the rebar or are associated with spalling. Similar to spalling, the greatest concern with this type of damage is the exposure of the rebar to water. In the case of a large or wide crack, particularly those associated with spalling, it is possible that the crack will allow water into the panel. If the rebar is exposed, it accelerates oxidation or rusting of this material, which causes the rebar to expand and break additional material off the surface of the panel. If a panel has a large or wide crack, the condition should be addressed immediately. The building owner or others responsible for the maintenance and preservation of the panel should contact the SCARNG Cultural Resource Manager in the Environmental Office or an historic preservation specialist who can provide advice on the best way to arrest the possible oxidation or process of rusting and fill the crack to prevent further exposure to water. This may include a rust retarding agent injected into the panel or simply the restoration of this particular element using an appropriate mortar repair. In the case of a hairline crack, it is less likely that the crack will allow water to access the rebar and cause spalling and additional damage. In these cases, the building owner or others responsible for the maintenance and preservation of the panel should contact the SCARNG Cultural Resource Manager in the Environmental Office or an historic preservation specialist who can provide advice on the best preservation treatment for this particular condition. Interventions may include filling the crack with an appropriate mortar repair or monitoring the crack for changes or loss of material that may warrant the use of a mortar repair.

Surface Pitting and Erosion

Surface pitting and erosion can occur in the form of pits on the surface of the panel, a loss of surface material that leaves the aggregate exposed in an elevated position, or a significant loss of material that alters the original design of the artistic work. This type of damage could be the result of sandblasting or weathering, but each of these mechanisms of decay will generally result in a different pattern of surface deterioration. Sandblasting is known to have been used on panels in the mid 20th century in an attempt to remove paint from some of the polychromed panels (Moser 2016). It is clear that at least one of the panels

in the Charleston area was sandblasted, as it was observed by the artist and documented in his correspondence (Smith 2014). A review of the panels in this area revealed two panels with significantly eroded surfaces and a general loss of detail. These include the North Charleston panel from 1954 and the undated Sumter Guards panel in North Charleston. Due to the significant loss of detail, these panels were almost certainly sandblasted. Other panels that may have been affected by less aggressive sandblasting include the Seneca (1955), Saluda (1960), Inman (1961), Lake City (1961), Beaufort (1963), and Mt. Pleasant (1963) panels. Several of these panels have monochrome paint coatings, which obscure some of the detail and prevent a more thorough assessment. It is also possible that the pitting on the surface of these particular panels was the result of more extreme environmental conditions that accelerated weathering of the surfaces. In general, sandblasted panels can vary in the overall depth of surface erosion, but will likely have a more significant loss of detail and edges over the surface of the panel. Weathering will generally result in surface pitting that will affect the most exposed areas of the panel, rather than concentrating on the edges and more detailed elements of the artistic work. While both conditions accelerate other forms of deterioration, sandblasted panels will generally express an overall loss of detail and alteration within the design itself. Whether the surface pitting and erosion was caused by sandblasting or weathering, the resulting conditions should be treated in the same manner.

It is important to note that surface pitting and erosion can also affect polychromed or monochrome panels. These conditions could have been obscured by polychrome or monochrome paint coatings, since deterioration of this type may have occurred prior to the application of the painted surfaces. This type of damage could also affect painted surfaces inconsistently. In cases where paint is flaking or delaminating, the original surface may have eroded in a similar manner to the unpainted panels. In other cases, the paint may have retained water and encouraged the development of cracks and spalling by restricting the ability of the panel to dry out in a timely manner after rain or other surface wetting. The greatest concern with this type of damage is that water will get into the pits and holes in the surface and freeze. When water freezes, its volume expands by approximately 10%, which can break the edges of the pits and holes and cause a gradual loss of materials and definition in the artwork. When surface pitting and erosion is present, efforts should be taken to prevent contact with water. This could take the form of an unobtrusive flashing detail installed above

the panel or a roof structure designed to shed water on either side of the panel. Under no circumstances should pitting or holes be filled without contacting the SCARNG Cultural Resource Manager in the Environmental Office or an historic preservation specialist who can provide advice on the best way to prevent further exposure to water and damage to the surface or assist in the specification of a repair mortar.

Staining

The types of staining addressed in this section include discoloration associated with iron and copper oxidation and are usually associated with architectural details located above the affected panel. Iron produces a rust or brown colored stain in a vertical pattern on the surface of the panel. Copper produces a green or black colored stain in a similar vertical pattern on the surface. Both of these stains have a vertical orientation because the ferrous oxide and cupric oxide materials are transported to the surface of the panel by water.

Iron

Iron staining on the surface of the panel can significantly affect the appearance of the panel and obscure original details of the artwork through the development of rust or brown discoloration on the surface. There is a two step process to address this issue. First, efforts need to be made to prevent the further movement of water from the oxidized ferrous metal above the panel. This should begin with treating the oxidized metal with a rust retarding agent and applying a protective coating that will prevent the recurrence of rust on this element. The treatment could also employ an unobtrusive flashing detail installed above the panel or a roof structure designed to shed water on either side of the panel and prevent further discoloration. Second, the building owner or others responsible for the maintenance and preservation of the panel should contact the SCARNG Cultural Resource Manager in the Environmental Office or an historic preservation specialist who can provide advice on the best preservation treatment for removing this type of stain.

Copper

Copper staining on the surface of the panel can significantly affect the appearance of the panel and obscure original details of the artwork through the development of green or black discoloration on the surface. Similar to the treatment of iron stains, there is a two step process to address this issue. First, efforts need to be made to prevent the further movement of water from the oxidized copper metal object above the panel. Unlike ferrous metal, copper is generally intended to oxidize and develop a patina that protects the metal and achieves a desired green appearance. For this reason, it is not generally practical to apply a protective coating that will prevent the recurrence of oxidation on this element. The treatment for this type of staining will likely be limited to the installation of an unobtrusive flashing detail above the panel or a roof structure designed to shed water on either side of the panel and prevent further discoloration. Second, the building owner or others responsible for the maintenance and preservation of the panel should contact the SCARNG Cultural Resource Manager in the Environmental Office or an historic preservation specialist who can provide advice on the best preservation treatment for removing this type of stain.

Vegetation

There are three types of vegetation addressed in this section, including trees and bushes, climbing vegetation, and mold and mildew. Trees and bushes are freestanding vegetation whose proximity to the panel can shade the surface and cause moisture to be retained on the surface for a longer period of time and increase the possibility that the water will cause additional damage. Climbing vegetation is a type of plant that attaches to the panel and surrounding wall using tendrils that grow into cracks and pits on the surface. Mold and mildew will produce a green, brown, or black discoloration in a variety of patterns on the surface of the panel.



Trees and Bushes

Trees and bushes are freestanding vegetation whose proximity to the panel can shade the panel and cause moisture to be retained on the surface for a longer period of time, which could increase the possibility that the water will cause the type of damage discussed in the previous sections on Fractures and Surface Pitting and Erosion. Water on the surface can infiltrate the panel through fractures, causing the rebar to oxidize and expand and cause spalling. Water can also collect in surface pitting and expand when freezing, causing the edges of the pits and holes to erode and a gradual loss of materials and definition in the artwork. When trees and bushes are present, efforts should be taken to prevent them from making direct contact with the surface or heavily shading the surface of the panel. This does not apply to larger trees that have a canopy well above the level of the panel, which may actually serve to protect and shed water away from the panel. When trees and bushes are in

direct contact or heavily shading a portion of the panel, they should be pruned or removed to prevent a recurrence of the condition.

Climbing Vegetation

Climbing vegetation is a type of plant that attaches to the panel and surrounding wall using tendrils that grow into cracks and pits on the surface. This is an invasive problem that can actively erode the surface of the panel and expand existing fractures. The proper treatment for this condition is a two step process. First, a large segment of the stem of the plant should be removed. This is typically achieved by cutting the stem at ground level and approximately 12” above the ground level to remove a significant portion of the vine, stem, or trunk, which will prevent the plant from sprouting new roots and continuing to grow on the surface of the panel and the surrounding wall. The vegetation should then be allowed to deteriorate and decay. Second, after the vegetation has dried and become brittle, it should be clipped or pruned along the surface of the panel and surrounding wall and removed. The tendrils that remain in the surface should be allowed to decompose naturally. Any attempt to clip or prune the vegetation while green or pull the dried tendrils from the surface can remove sections of the panel and wall and erode the surface of both materials.

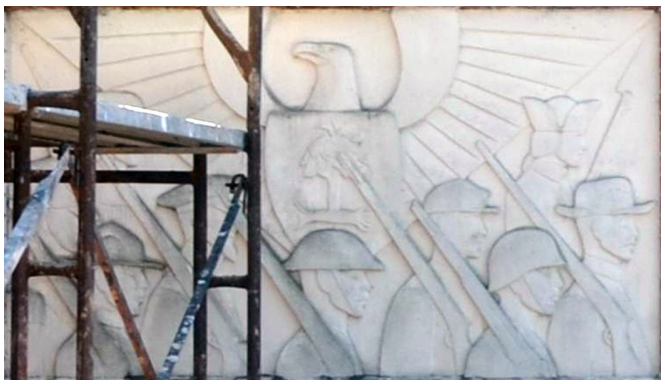
Mold and Mildew

Mold and mildew will produce a green, brown, or black discoloration in a variety of patterns on the surface of the panel. It may occur in vertical orientation similar to the iron and copper stains discussed in the previous section. This is due primarily to the movement of water across the surface of the panel. In this case, the movement of water produces an environment suitable for this type of vegetation. It may also occur in a more diffused pattern across the surface as a result of heavy shading or contact with trees, bushes, or climbing vegetation. There is a two step process to address this issue. First, water should be removed from the environment to the greatest extent possible, and the surface of the panel should be allowed to dry. This could involve the installation of an unobtrusive flashing detail above the panel or a roof structure designed to shed water to either side of the panel and eliminate the moist environment supporting the growth of mold and mildew. It may also involve pruning or

removing trees or bushes shading the panel and extending the period of time required for the panel to dry after a rain or other event wetting the surface. Second, the building owner or others responsible for the maintenance and preservation of the panel should monitor the vegetation to confirm that it begins to dissipate. If providing a drier environment and cleaning the panel using the previously discussed methods does not correct the issue or leaves a stain on the surface significant enough to obscure the detail of the original artwork, the building owner or others responsible for the maintenance and preservation of the panel should contact the SCARNG Cultural Resource Manager in the Environmental Office or an historic preservation specialist who can provide advice on the best preservation treatment for removing this type of stain.

Construction

Although construction may not have affected all of the existing panels, it is important to consider this potential cause of damage when planning building maintenance or construction projects. This can involve routine or recurring maintenance, such as painting and roofing projects, or larger rehabilitation and restoration projects. In any of these cases, it is imperative that the building owner or others responsible for the maintenance and preservation of the panel provide adequate and appropriate protection for the panel for the duration of the specified scope of work.



Routine Maintenance

There are two issues that should be considered when discussing routine maintenance, including the treatment of issues and conditions caused by previous maintenance work and the prevention of future issues through the use of adequate and appropriate protection for the duration of the specified scope of work. The types of routine maintenance that have adversely affected the existing panels primarily include painting and roofing. Several panels have paint splatter or drips that are not consistent with the intentional polychroming that occurred in the early history of the panels. Other panels have thick, black spots that are consistent with roofing tar. In these cases, the building owner or others responsible for the maintenance and preservation of the panel should contact the SCARNG Cultural Resource Manager in the Environmental Office or an historic preservation specialist who can assess the condition of the panel, determine whether the materials should be removed, and if necessary, provide

advice on the best preservation treatment for removing these materials. For future projects of this type, care should be taken to adequately protect the surface of the panel in a manner that is appropriate for the planned maintenance activity for the duration of the project. When painting, the panel can be adequately protected using a tarp or drop cloth draped over the surface. This protection should not be attached or anchored directly to the panel or the wall surrounding the panel. It may be most effective to hang it from a temporary frame or scaffold in front of the panel. When roofing, the panel should be protected in a more substantial manner, particularly when materials and tools will be transported to the roof in the area or the primary worksite is in the general vicinity of the panel. In this case, a temporary frame with a plywood or equally impact resistant surface should be installed to completely cover the panel. This protection should not be attached or anchored directly to the panel or the wall surrounding the panel.

Construction Protection

The building owner or others responsible for the maintenance and preservation of the panel should adequately protect the surface of the panel in a manner that is appropriate for the planned maintenance activity for the duration of the project. When the risk of an impact to the surface of the panel is low, the panel can be adequately protected using a tarp or drop cloth draped over the surface and remain in place for the duration of the project. This protection should not be attached or anchored directly to the panel or the wall surrounding the panel. It may be most effective to suspend the protective materials from a temporary frame or scaffold in front of the panel. When the risk of an impact to the surface of the panel is moderate to high, the panel should be protected in a more substantial manner, particularly when materials, tools, and equipment will be stored in the area or the primary worksite is in the general vicinity of the panel. In this case, a temporary frame with a plywood or equally impact resistant surface should be installed to completely cover the panel. This protection should not be attached or anchored directly to the panel or the wall surrounding the panel and should remain in place for the duration of the project.

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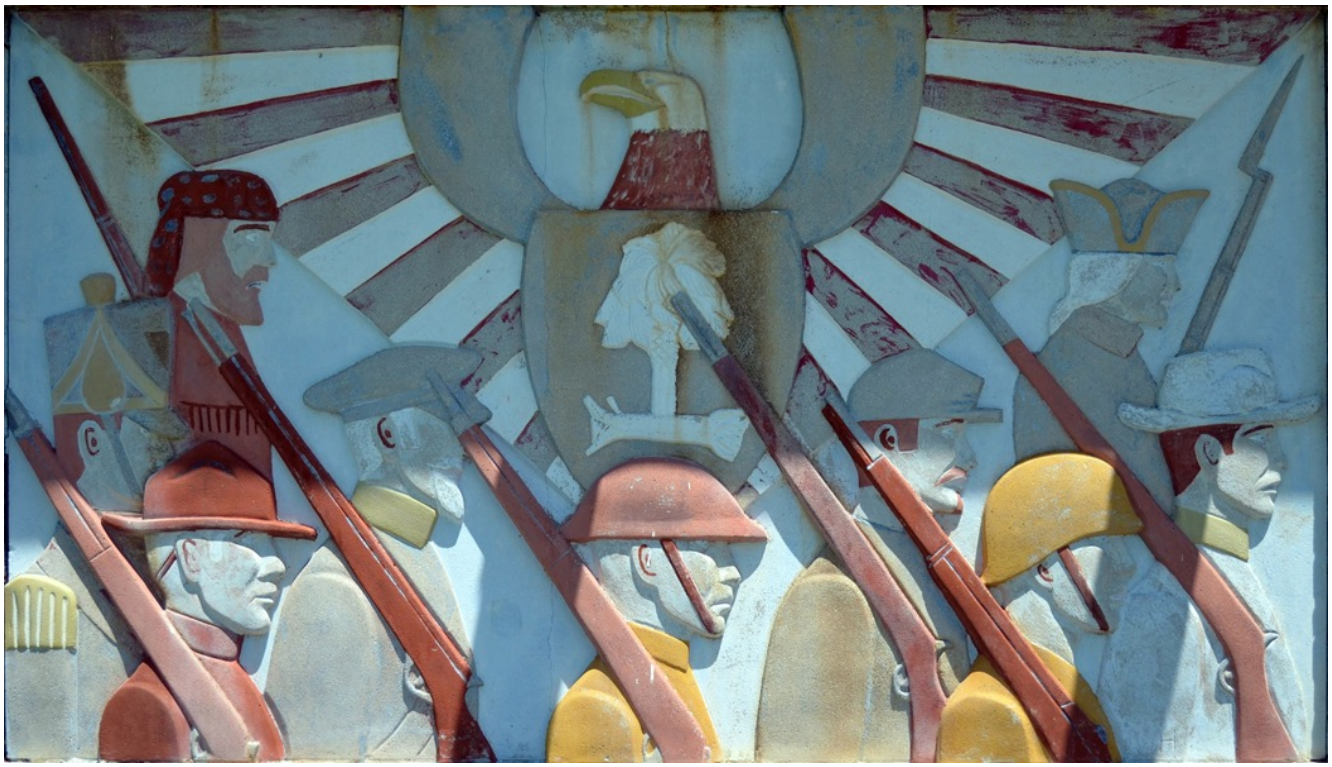
Appendix

This section provides a full set of rectified images of the Willard Hirsch panels surveyed and documented by Karen Smith, PhD in the 2014 report entitled “Faces of the Guard: A Portrait of the Willard Hirsch Panel Then and Now.” These images are presented in chronological order in order to facilitate dating repairs to the mold, which resulted in slight alterations to the panels over time. One panel with an unknown date is presented at the end. When multiple panels were constructed in the same year, panels in original condition are presented first, followed by polychrome and monochrome panels. All images were taken by Karen Smith, PhD and modified for use in this report by Dawn Chapman Ashlock, PhD.

Image	Armory	Built	General Condition
A1	Mullins	1953	Polychrome
A2	Gaffney	1954	Monochrome
A3	North Charleston	ca. 1954	Monochrome
A4	Woodruff	1954	Monochrome
A5	Barnwell	1955	Original
A6	Edgefield	1955	Monochrome
A7	Seneca	1955	Monochrome
A8	St. Matthews	1955	Monochrome
A9	York	1955	Monochrome
A10	Hemingway	1956	Original
A11	Ware Shoals	1956	Polychrome
A12	Williamston	1956	Polychrome
A13	Bamberg	1958	Original
A14	Conway	1960	Polychrome
A15	McCormick	1960	Polychrome
A16	Saluda	1960	Monochrome
A17	Clover	1961	Original

Image	Armory	Built	General Condition
A18	Inman	1961	Original
A19	Jonesville	1961	Original
A20	Lake City	1961	Original
A21	Belton	1961	Polychrome
A22	Whitmire	1961	Monochrome
A23	Chesterfield	1962	Original
A24	Pacolet	1962	Polychrome
A25	Beaufort	1963	Original
A26	Myrtle Beach	1963	Polychrome
A27	Mount Pleasant	1963	Monochrome
A28	Clemson	1964	Original
A29	Greenwood	1964	Monochrome
A30	Anderson	1965	Monochrome
A31	Rock Hill	1965	Monochrome
A32	Lancaster	1968	Polychrome
A33	Walterboro	1969	Original
A34	Dillon	1969	Polychrome
A35	Orangeburg	1969	Monochrome
A36	Florence	1972	Monochrome
A37	Sumter Guards in North Charleston		Monochrome



A1: Mullins (1953) Polychrome

A2: Gaffney (1954) Monochrome

A3: North Charleston (ca.1954) Monochrome

A4: Woodruff (1954) Monochrome

A5: Barnwell (1955) Original

A6: Edgefield (1955) Monochrome

A7: Seneca (1955) Monochrome

A8: St. Matthews (1955) Monochrome

A9: York (1955) Monochrome

A10: Hemingway (1956) Original

A11: Ware Shoals (1956) Polychrome

A12: Williamston (1956) Polychrome

A13: Bamberg (1958) Original

A14: Conway (1960) Polychrome

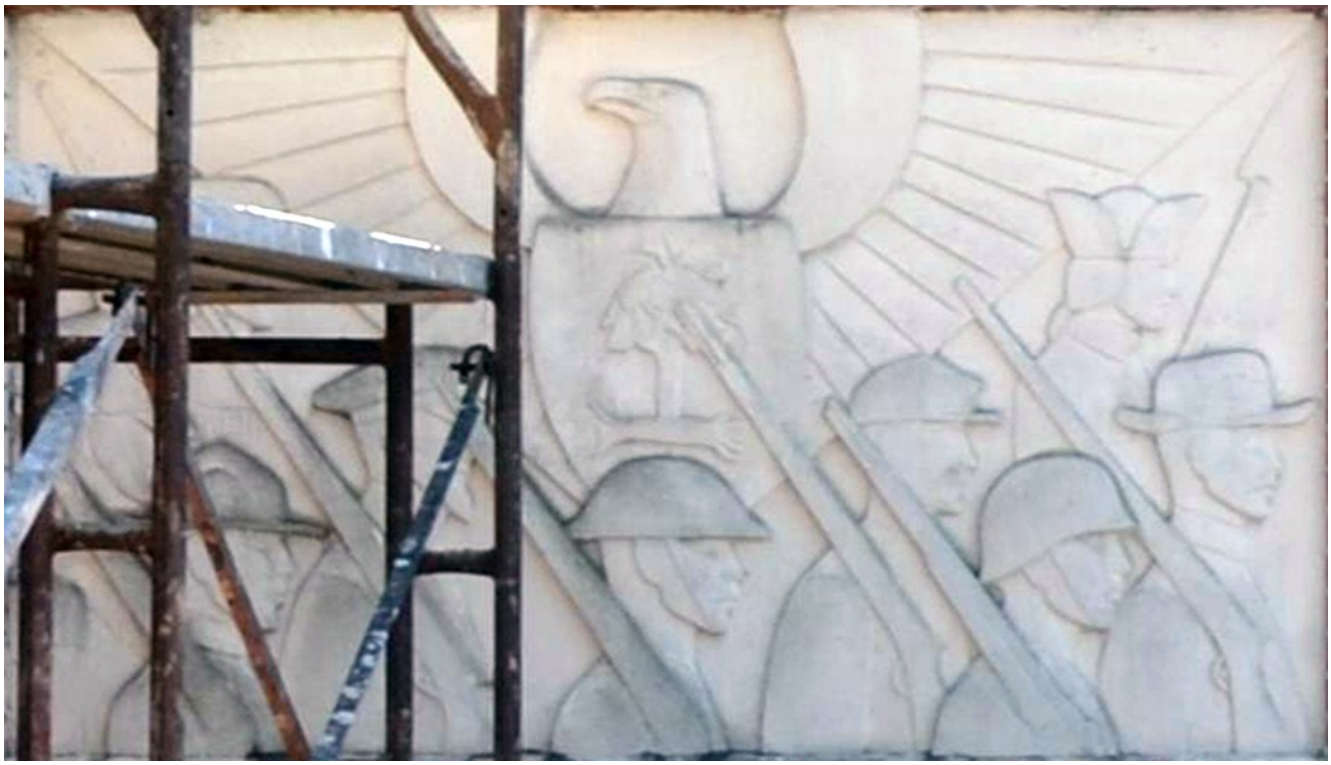
A15: McCormick (1960) Polychrome

A16: Saluda (1960) Monochrome

A17: Clover (1961) Original

A18: Inman (1961) Original

A19: Jonesville (1961) Original



A20: Lake City (1961) Original

A21: Belton (1961) Polychrome

A22: Whitmire (1961) Monochrome

A23: Chesterfield (1962) Original

A24: Pacolet (1962) Polychrome

A25: Beaufort (1963) Original

A26: Myrtle Beach (1963) Polychrome

A27: Mount Pleasant (1963) Monochrome

A28: Clemson (1964) Original

A29: Greenwood (1964) Monochrome

A30: Anderson (1965) Monochrome

A31: Rock Hill (1965) Monochrome

A32: Lancaster (1968) Polychrome

A33: Walterboro (1969) Original

A34: Dillon (1969) Polychrome

A35: Orangeburg (1969) Monochrome

A36: Florence (1972) Monochrome

A37: Sumter Guards in North Charleston (Unknown) Monochrome