

Exterior Stucco Condition Assessment and Treatment Recommendations

for

Building 38 – Tearney Building
at
Harpers Ferry National Historical Park
Harpers Ferry, WV

September 2019



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Introduction

Lindy Gulick, NCR architectural conservator visited Building 38- Tearney Building on September 6th-7th, 2018 and in May 2019 to assess the current conditions of the rear exterior stucco. The purpose of this site visit was to provide Harpers Ferry National Historical Park with a brief condition assessment and treatment recommendations for PMIS 246165 “Preserve Tearney Building Historic Exterior Stucco in Lower Town Harpers Ferry.”

The goal of this document is to provide the current condition of the stucco, an abbreviated scope of work, and treatment recommendations that will be used to supplement the existing PMIS statement.

The recommendations for treatment in this document are based on:

- National Park Service, Technical Preservation Brief, Preservation Brief #22 The Preservation and Repair of Historic Stucco (<https://www.nps.gov/tps/how-to-preserve/briefs/22-stucco.htm>)
- The Secretary of the Interior’s Standards for the Treatment of Historic Properties (<https://www.nps.gov/tps/standards.htm>)
- National Park Service, Historic Structures Report- Building 38, October 1982, prepared by Susan L. Shufelt, National Capital Team, Denver Service Center.

Most observations were made visually but additional testing was made by acoustic sounding (lightly tapping with the flat of a fingernail and one knuckle to listen for changes in tone). The sounding was used to determine the presence of voids and detachment of the plaster from the substrate along the wall. Material testing and analysis was not performed on the exterior stucco or finish coat.

Brief History and Past Treatment

The historic Tearney Building was erected in 1844 and is currently being used as an interpretive space for the park. The interior and exterior of Building 38 provides visitors with representative examples of 19th and 20th century plaster, stucco, and paint. The interior first floor houses an archaeology exhibit which exposes the evolution of the building foundations below ground in addition to exposing sections of the building construction. The exterior lower and upper levels are accessible to the public by way of stairs and a rear porch. The interior spaces of the upper levels are not accessible to the public and are not part of this assessment.

Visual site inspections of the rear exterior stucco are documented to have been performed in 2012, 2013, and 2017. There is not supporting written or photographic documentation to confirm the condition of the exterior stucco or to show the conditions over time nor is there information available to date when repairs were made to the exterior stucco, primarily the repairs on the 2nd floor.

The Historic Structures Report for Building 38 from October 1982, prepared by Susan L. Shufelt, describes the materials used to construct the exterior walls of the building and the condition of the stucco in 1982. “The front and rear walls of Building 38 are constructed of stone and are covered on the exterior with stucco. The walls are about 1 foot, 9 inches thick at the first floor level and narrow down to about 1 foot, 7 inches on the third floor level. Remains of whitewash are evident on the rear wall stucco and much of the stucco on the first floor level of this wall has been removed.”¹ The HSR for this building provides the only information on the materials used and the condition of the stucco as observed in 1982. There is no mention of the non-historic repairs that were made to the stucco on the 2nd floor. These repairs were likely performed after this report was written but the timeline is unknown.

¹ Historic Structures Report- Building 38, October 1982, prepared by Susan L. Shufelt, National Capital Team, Denver Service Center, pg. 23.

There is no information provided to suggest that any stucco conservation measures have previously been taken on the exterior first and second floor elevations. The exterior stucco on the second floor shows evidence of at least two campaigns of stucco repair and replacement. The areas are evident by the color and texture that appear noticeably different from the mixture (lime, sand) that is assumed to date from the buildings' nineteenth century construction.

For comparison purposes, two photographs showing the upper rear floor are shown side by side from 1981 and 2019. These photographs show the deteriorated condition of the exterior stucco as seen in the 1981 photograph and evidenced by the exposed brown coat, flaking paint, and uneven and bowing appearance of the stucco. The 2019 photograph of the same location shows areas that appear to be in similar to condition to that of the 1981 photograph (exposed brown coat, flaking paint, and detached or bowed stucco) but also smooth sections that appear to be modern repairs (see red arrows indicating likely repair locations). The repair locations are primarily located above door frames and under windows and appear to be stable.

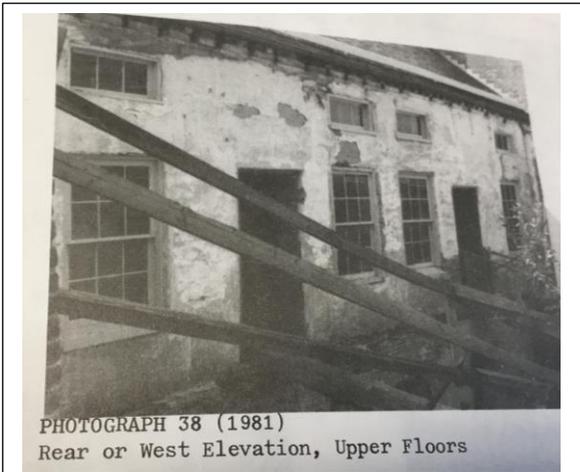


Figure 1. Photograph from 1982 HSR showing the conditions of the rear upper floors.



Figure 2. Photograph from the May 2019 assessment showing the condition of the rear upper floors.

Current Conditions- First Floor

The current condition of the exterior stucco on the first and second floor is in poor condition. There is little remaining historic stucco on the first floor (as recorded in the 1982 HSR). The brown scratch coat appears on

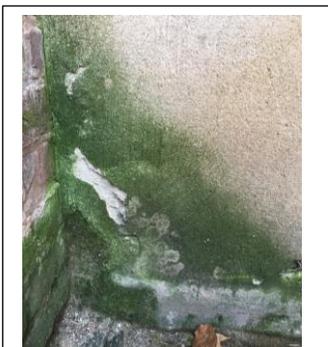


Figure 3. Biological growth on the rear lower section.



Figure 4. Detail photograph of the scratch coat showing lime blebs (red arrow), shells, and well sorted aggregate.



Figure 5. Detail photograph of the friable crumbling condition of the scratch coat and run down on adjacent stone.

roughly 25% of the surface and is more concentrated at the top of the wall. The brown scratch coat is very friable and crumbles when touched. Lime blebs, small shells, and coarse to fine aggregate are visible to the naked eye in the brown coat.

There is evidence of the existing stucco coating at the far ends of the first floor. The whitewashed finish coat appears on roughly 10% of the surface. There is a heavy accumulation of green biological soiling that appears on the bottom section of the whitewashed stucco, primarily in the corners of the building. There are also several horizontal and vertical cracks that appear in the stucco along the door frames or along areas that appear to be detached. There are some instances of material loss but these are minimal and appear in areas that have cracks or detached stucco. The conditions and treatment recommendations are illustrated in further detail in Appendix A-First Floor Conditions.



Figure 6. Overall photograph of the first floor, showing the exposed rubble stone, bricked in opening, and remnants of the stucco and brown coat.



Figure 7. Overall photograph of the first floor showing current conditions. Cracks, biogrowth, and the current condition of the exterior stucco.

Current Conditions- Second Floor

The original or historic stucco remaining appears on roughly 30% of the upper floor and in most instances is in poor condition. This original stucco appears to have had several applications of a whitewash coating that has been applied. The whitewash appears to be keeping a majority of the stucco intact. The conditions of the original stucco includes; detached or bowing stucco, large areas of losses, friable or crumbling paint and stucco, friable scratch coat, horizontal and vertical cracks, and general soiling and biological growth.

There are several non-historic repairs that were done within the last thirty years that appear to be in stable condition as compared to the historic stucco. The non-historic repairs appear under or around most of the windows and these repairs appear to be sound and are likely cementitious based repairs. The surface of these non-historic repairs are smooth compared to the original material that is detached, bowing from the surface, and crumbling in several locations. There are several layers of paint and limewash that have been applied over time in varying colors. It is recommended that paint analysis be performed to determine the original intent and material composition of the finish coat prior to re-painting.



Figure 8. Dark biological soiling at the bottom of the upper level section. Also note the exposed stucco where the whitewash/coating is gone.



Figure 9. Crumbling and friable plaster and coating under a window. Note how the stucco has deteriorated and is detached.



Figure 10. Large horizontal cracks located above the door frame and areas of stucco loss adjacent to the window.



Figures 11 & 12. A section of the original historic stucco (red box) and the overlapping area of the non-historic repair (blue arrow). Figure 10. Note the layers of paint and how far the paint/top layer of stucco has detached from the brown coat.

Without performing material analysis it is unknown if the non-historic repairs to the stucco are Portland cement based but it is assumed due to the appearance and strength of the repairs that a combination of Portland cement and lime was used.

There are also several horizontal and vertical cracks that appear in the stucco along the door frames in the non-historic repairs. There are some instances of material loss that appears in areas that have cracks or detached stucco. A majority of the original fabric is in poor condition.

The conditions and treatment recommendations are illustrated in further detail in Appendix B- Second Floor Conditions.

Recommendations for Treatment:

General recommendations- First Floor: Stabilize the existing material that remains and re-apply the stucco and whitewash on the entire first floor level. The original intent of the building was to have a stucco exterior and therefore the stucco should be reinstalled to protect building materials that were never meant to be exposed to water.

TEST all cleaning and consolidation products and methodology prior to full scale implementation.

- General cleaning should be performed to remove surface soiling and biological growth. Only hose pressurized water should be used for the cleaning along with natural bristle brushes and a biocide (quaternary ammonium compound). Care should be taken to avoid cleaning where material is extremely friable. A pressure washer should NOT be used to clean the historic material.
- Areas where there is flaking paint the paint loose paint should be removed and the surface prepped for painting.
- Re-adhere loose stucco fragments and reattach and inject around the repair location. Most of the stucco fragments are spalls from corner sections of door frames or windows that have large cracks and are partially or fully detaching. The stucco fragment should be removed and the exposed material should be cleaned with a stiff brush and a solution of Paraloid B-72 or B-67 should be applied. The exposed plaster brown coat should be consolidated with the Paraloid B-72 or B-67 and left to cure overnight. The acrylic adhesive (also used to re-key plaster) should be applied to the backside of the stucco piece. The stucco fragment should be reinstalled in its original location and supported with temporary padded shoring until the adhesive has cured. The cracks/voids around the plaster fragment should be injected with the finish coat of the plaster mix.
- It is recommended that the cracks be injected with either the finish plaster mix or an acrylic or lime based grout to prevent further deterioration and potential water ingress.
- Remove friable, bowing, and crumbling stucco and consolidate around stable edges with a solution of Paraloid B-72 or B-67.
- Consolidate the existing brown coat with consolidation materials (test the consolidation products first). The crumbling/friable stucco or brown coat should be consolidated with the appropriate products (Paraloid B-72, Paraloid B-67, Rhoplex MC-76, OH100) that will be tested to determine the best solvent to use that will not stain the adjacent surfaces. The consolidant will be applied with either a plastic pipette or a needle and syringe to the affected area.
- Mortar analysis should be conducted to determine the material composition of the stucco. Use a historically compatible mix to reapply the stucco on the entire first floor.
- Color match the earliest finish coat to the Munsell Color System and select the finish coat to match this color.

General recommendations- Second Floor: Stabilize the existing historic material, if possible with consolidants. If it is determined that the historic material remaining on the upper level cannot be saved then it should be carefully removed and the surface prepped for new stucco. The non-historic repairs should be assessed to determine if they are sound and the material is compatible with the new stucco repairs. Cracks and losses in the sound non-historic material should be injected, reattached, or rebuilt as needed.

TEST all cleaning and consolidation products and methodology prior to full scale implementation.

- General cleaning should be performed to remove surface soiling and biological growth. Only hose pressurized water should be used for the cleaning along with natural bristle brushes and a biocide (quaternary ammonium compound). Care should be taken to avoid cleaning where material is extremely friable. A pressure washer should NOT be used to clean the historic material.
- Areas where there is flaking paint the paint loose paint should be removed and the surface prepped for painting.
- Remove loose material to a sound surface. This may include removing historic material that has deteriorated to the point where it cannot be conserved.
- Re-adhere loose stucco fragments and reattach and inject around the repair location. Most of the stucco fragments are spalls from corner sections of door frames or windows that have large cracks and are partially or fully detaching. The stucco fragment should be removed and the exposed material should be cleaned with a stiff brush and a solution of Paraloid B-72 or B-67 should be applied. The exposed plaster brown coat should be consolidated with the Paraloid B-72 or B-67 and left to cure overnight. The acrylic adhesive (also used to re-key plaster) should be applied to the backside of the stucco piece. The stucco fragment should be reinstalled in its original location and supported with temporary padded shoring until the adhesive has cured. The cracks/voids around the plaster fragment should be injected with the finish coat of the plaster mix.
- It is recommended that the cracks be injected with either the finish plaster mix or an acrylic or lime based grout to prevent further deterioration and potential water ingress.
- Remove friable, bowing, and crumbling stucco and consolidate around stable edges with a solution of Paraloid B-72 or B-67.
- Consolidate the existing brown coat with consolidation materials (test the consolidation products first). The crumbling/friable stucco or brown coat should be consolidated with the appropriate products (Paraloid B-72, Paraloid B-67, Rhoplex MC-76, OH100) that will be tested to determine the best solvent to use that will not stain the adjacent surfaces. The consolidant will be applied with either a plastic pipette or a needle and syringe to the affected area.
- Mortar analysis should be conducted to determine the material composition of the stucco. Use a historically compatible mix to reapply the stucco on the entire first floor.
- Color match the earliest finish coat to the Munsell Color System and select the finish coat to match this color.

APPENDIX A: FIRST FLOOR



BLUE ARROWS: Remove biological growth with a biocide, hose, and natural bristle brushes (pressure washer should not be used on friable stucco).

RED BOXES/LINES: Indicate locations where stucco/scratch coat should be consolidated (these locations are crumbling and friable). Consolidation materials should be tested first before large-scale implementation.

FIRST FLOOR CONDITIONS



RED BOXES/LINES: Indicate locations where stucco/scratch coat should be consolidated (these locations are crumbling and friable). Consolidate around the edges of the stucco and in cracks as needed.

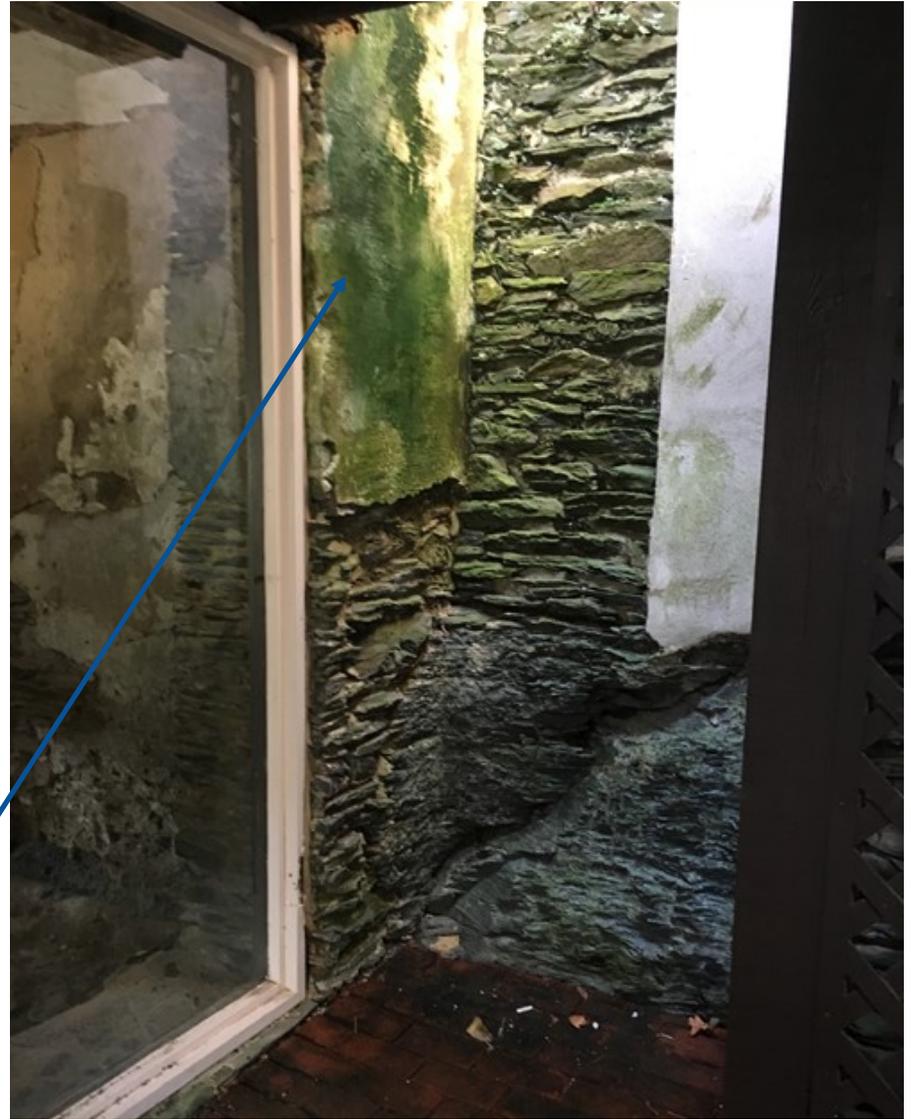


BLUE ARROWS: Remove biological growth with a biocide, hose, and natural bristle brushes (pressure washer should not be used on friable stucco). In this section, the biogrowth should be removed first before consolidation. Arrow points to general conditions.

FIRST FLOOR CONDITIONS



BLUE ARROWS: Remove biological growth with a biocide, hose, and natural bristle brushes (pressure washer should not be used on friable stucco). In this section, the bio-growth should be removed first before consolidation. Arrow points to general conditions.



RED LINES: Indicate locations where there are cracks that should be consolidated. In some cases the material may need to be removed and then reattached. Consolidate around the edges of the stucco and in cracks as needed.

APPENDIX B

SECOND FLOOR CONDITIONS



BLUE ARROWS: Remove biological growth with a biocide, hose, and natural bristle brushes (pressure washer should not be used on friable stucco). Bio-growth is present on the lower section of the stucco.

RED BOXES/LINES: These locations indicate areas that are extremely friable and need to be either consolidated or removed and replaced with in kind material. Treatment will vary based on the conditions. Inject cracks as needed around window and door frames.

SECOND FLOOR CONDITIONS

This section appears to be stable but was not accessed during the investigation so it should be closely inspected to determine the treatment needed.



BLUE ARROWS: Remove biological growth with a biocide, hose, and natural bristle brushes (pressure washer should not be used on friable stucco). Bio-growth is present on the lower section of the stucco.

YELLOW ARROWS: Renew whitewash coating as needed.

RED BOXES/LINES: These locations indicate areas that are extremely friable and need to be either consolidated or removed and replaced with in kind material. Treatment will vary based on the conditions. Inject cracks as needed around window and door frames.

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YELLOW ARROWS: Renew whitewash coating as needed.