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Construction Engineering  
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US Army Corps  
of Engineers®  
Engineer Research and  
Development Center

# Fort Leonard Wood Maintenance and Repair Manual

## Black Officers' Club

Adam Smith and Marcia Harris

June 2005



# Maintenance and Repair Manual Building 2101—Black Officers' Club

**FINAL**

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Development Center

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# Preface

This study was conducted for the U.S. Army Garrison Fort Leonard Wood, Directorate of Public Works/Environmental Division/Natural Resources Branch, Fort Leonard Wood, MO under project number CNC-Q093, “Cultural Resources Management Activities, M & R Manuals.” Funding was provided by Military Interdepartmental Purchase Request 21/2020/220/A/MIPR3CERL07DE/PO, dated 30 April 2004. The Fort Leonard Wood technical monitor was Stephanie Nutt, Historic Archeologist.

The work was performed by the Land and Heritage Conservation Branch (CN-C) of the Installations Division (CN), Construction Engineering Research Laboratory (CERL). The CERL Project Manager was Adam Smith. Dr. Lucy A. Whalley is Chief, CN-C, and Mike Golish is Acting Chief, CN. The Acting Director of CERL is Dr. Ilker R. Adiguzel.

CERL is an element of the U.S. Army Engineer Research and Development Center (ERDC), U.S. Army Corps of Engineers. The Commander and Executive Director of ERDC is COL James R. Rowan and the Director of ERDC is Dr. James R. Houston.

# 1.0 MAINTENANCE RECORD

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

This is a record of all of the maintenance proposed for the Fort Leonard Wood buildings. For a more detailed record, please consult each individual element section as well as the maintenance and management guidelines and procedures, which follow for site, masonry, metal, wood, roofing, doors and windows, and furnishings. Preservation and rehabilitation should be undertaken as sensitively as possible strictly following recommendations for treatment for particular zones correcting all deficiencies of the element. Recommendations for maintenance and management of each particular element should be strictly followed, and work should be logged in the back of this manual (date, weather conditions, supervisor signature, contractor information, work performed, and problems).

## **Site:**

- Soil should be cleared from the base of the building in order to prevent mold growth.
- NR Rating: 112

## **Concrete-Foundation System:**

- Repair as necessary with materials in-kind to original in both appearance and mechanical properties. See concrete section for detailed repair recommendations.
- NR Rating: 112

## **Concrete-Drainage Ditch Base:**

- Repair as necessary with materials in-kind to original in both appearance and mechanical properties. See concrete section for detailed repair recommendations.
- Remove soil, leaves, and debris to ensure proper water drainage.
- NR Rating: 112

## **Concrete-Porch Stoop:**

- Repair as necessary with materials in-kind to original in both appearance and mechanical properties. See concrete section for detailed repair recommendations.
- NR Rating: 116

## **Masonry- Brick Fireplace:**

- Repoint mortar where necessary using materials in-kind to original in both appearance and mechanical properties.
- Brick surfaces should be cleaned without abrasives and a protective coating should be applied to the interior brick cavity and floor.
- NR Rating: 112

## **Masonry- Stone Chimney:**

- Replace exterior stone with more than 50% surface spalling and repoint mortar where necessary using materials in-kind to original in both appearance and mechanical properties.
- Treat stone for mildew growth.
- NR Rating: 112

### **Masonry- Stone Retaining Walls:**

- Repoint mortar where necessary using materials in-kind to original in both appearance and mechanical properties.
- Remove vegetation between joints, clean stone, and replace any missing elements as per preservation standards.
- NR Rating: 112

### **Masonry- Stone Sidewalks:**

- Clean and relay stone walkways so that they are level.
- Remove overgrown plantings, dirt, and debris from surface of stone.
- Replace missing stones as per preservation standards.
- NR Rating: 112

### **Masonry- Stone Steps:**

- Clean and relay stone steps so that they are level.
- Remove overgrown plantings, dirt, and debris from surface of stone.
- Replace missing stones as per preservation standards.
- NR Rating: 112

### **Masonry- Stone Swales:**

- Clean and treat stone for mildew growth.
- Remove overgrown plantings, dirt, and debris from surface of stone.
- Replace missing stones as per preservation standards.
- NR Rating: 112

### **Metal-Fascia:**

- Remove to reveal wood fascia below.
- NR Rating: 115

### **Metal-Gutter:**

- Remove.
- NR Rating: 115

### **Metal- Hardware:**

- Rusty hardware.
- Clean rusty hardware and replace in-kind if beyond surface cleaning.
- NR Rating: 113

### **Metal-Louver:**

- Remove to reveal wood louvers below.
- NR Rating: 115

### **Metal-Railing:**

- Surface should be cleaned, scraped, primed, and repainted to prevent further damage.
- NR Rating: 116

### **Metal-Siding:**

- Remove to reveal wood siding below.
- NR Rating: 115

### **Wood-Fascia:**

- Wood should be cleaned, scraped, primed, and repainted without neglecting the endgrain.
- Repair damaged wood as detailed later in this manual, and replace any element that is beyond repair or missing.
- NR Rating: 112

### **Wood-Louver:**

- Wood should be cleaned, scraped, primed, and repainted without neglecting the endgrain.
- Repair damaged wood as detailed later in this manual, and replace any element that is beyond repair or missing.
- NR Rating: 112

### **Wood- Siding:**

- Wood should be cleaned, scraped, primed, and repainted without neglecting the endgrain.
- Repair damaged wood on entire building as detailed in the wood chapter of this maintenance manual, and replace any element that is beyond repair or missing.
- NR Rating 112

### **Wood-Skirt:**

- Debris should be cleared from the base of the building. A 3” minimum gap should be created between the bottom of the skirting and the gravel to prevent deterioration of the wood.
- Wood should be cleaned, scraped, primed, and repainted without neglecting the endgrain.
- Repair damaged wood on entire building as detailed in the wood chapter of this maintenance manual, and replace any element that is beyond repair or missing.
- NR Rating: 112

### **Roof-Asphalt Shingles:**

- Inspect yearly for signs of wear and localized failure.
- Replace missing roof flashing to protect surrounding elements from water damage.
- NR Rating: 114

### **Windows:**

- Metal frames should be removed to reveal wood frames below.
- Wood frames should be cleaned, scraped, primed, and repainted without neglecting the endgrain.
- NR Rating: 114

**Doors:**

- Wood doors will need to be replaced. Appropriate doors can possibly be found in the other temporary buildings. This should be the primary source for replacement doors for any of the historic buildings.
- Metal doors are in poor condition and will need to be replaced using doors from other temporary buildings.
- NR Rating: 115

**Furnishing:**

- Cleaning and repair of the mural will result only from professional recommendation.
- Repair or maintenance of the mural is to be executed only by a qualified professional.
- NR Rating: 111

## 2.0 STAGE I – GENERAL INFORMATION

### 2.1 Background

The Fort Leonard Wood (FLW) historic building maintenance and repair program is based on three successive steps with each step providing a foundation for the next level. The first step is the identification and documentation of the historic building and classification of each building so that it may be compared to others. Steps two and three provide additional levels of documentation within each building. Step two allows the identification and prioritization of significant interior and exterior areas, or zones. Step three allows the identification and rating of the significant architectural elements of each zone, as well as providing maintenance and repair instructions, where deficiencies exist.

The building data is gathered through field inspections conducted by teams of architects and/or related professionals. This data is then gathered into three stages described below. The stages are:

Stage I is the general identification information, including the background material necessary to establish a "frame of reference" for the building. It includes data on location, identification, size, codes, and related programs.

Stage II allows the organization of the building into one or more zones, or areas of varying importance for historical and architectural reasons. Stage II contains descriptive information plus photographs and drawings to identify the areas.

Stage III contains the identification, evaluation, and description of individual architectural features or elements within each zone established in Stage II. Stage III also identifies deficient elements and allows work recommendations and cost estimates to correct these deficiencies. The elements are organized into several divisions, such as Exterior, Interior, or Electrical. It is the data in Stage III, which is most applicable to the maintenance, repair, and rehabilitation of the building.

The data collected by the FLW historic building maintenance and repair program is reported in a maintenance and repair manual. It is organized into two parts: graphic documentation and written information. The graphic portion consists of photographs and floor plans of the building as it existed at the time of the inspection, plus the zoned building plans. The written portion consists of the various elements of the building and potential repair/replacement options guided by the Secretary of the Interior Standards.

NR RATING - The objective of Stage I is the classification of all historic properties. The purpose of the classification is to establish a ranking of architectural and/or historical significance. NR Rating, therefore, is a number from 1 to 8, which represents this classification. The definitions are as follows:

CLASS 1 - A building, which is highly distinctive or unique. A National Historic Landmark or National Register building of National significance.

CLASS 2 - A building on, or eligible for, the National Register at the National significance level. A typical example of a recognized architectural style, having all the primary features and details intact.

CLASS 3 - A building on, or eligible for, the National Register at the State or Local significance level.

CLASS 4 - A building which is potentially eligible for the National Register because it appears to meet the criteria, but which has not been listed or evaluated.

CLASS 5 - A building 50 years old or older which has not been evaluated for National Register eligibility.

CLASS 6 - 45-50 - Pending. A building 45 to 50 years old which is not eligible for the National Register, but with the passing of time may become eligible and needs re-evaluation.

CLASS 7 - A building which has been determined to be ineligible for the National Register.

CLASS 8 - Non-Historic.

## **2.2 General Information**

LOCATION: Southwest corner of Second Street and Replacement Avenue, Fort Leonard Wood, Pulaski County, Missouri

USGS Devils Elbow, Missouri, United States Quadrangle,

Universal Transverse Mercator Coordinates: Zone 15

Northing 4179844

Easting 579079

PRESENT OWNER: Department of Defense  
Department of the Army  
Fort Leonard Wood

ORIGINAL USE:

Administration Building, Black Officers' Club

PRESENT USE:

Office

DATE OF CONSTRUCTION: May 1941

SIGNIFICANCE:

Although many administration buildings were built at Fort Leonard Wood during the World War II mobilization, Building 2101 is the only one that was transformed from its intended use to that of an officers' club. As a service club for African-American officers, it served a critical function within the entire Fort Leonard Wood cantonment. The significance of this building is related to its status as a WWII temporary building, changes to the plan for the service club, the POW stonework, and the mural by Samuel Albert Countee over the POW built fireplace. The Black Officers' Club is in the northeastern portion of the cantonment and was identified as eligible for the National Register through various reports.

BUILDING NUMBER - 2101

NR - Eligible

HABS/HAER – A number does not exist at this point in time, but will in the near future.

NR RATING - CLASS 1

DESCRIPTION:

Although many administration buildings were built at Fort Leonard Wood during the World War II mobilization, Building 2101 is the only one that was transformed from its intended use to that of an officers' club. As a service club for African-American officers, it served a critical function within the entire Fort Leonard Wood cantonment. The significance of this building is related to its status as a WWII temporary building, changes to the plan for the service club, the POW stonework, and the mural by Samuel Albert Countee over the POW built fireplace.

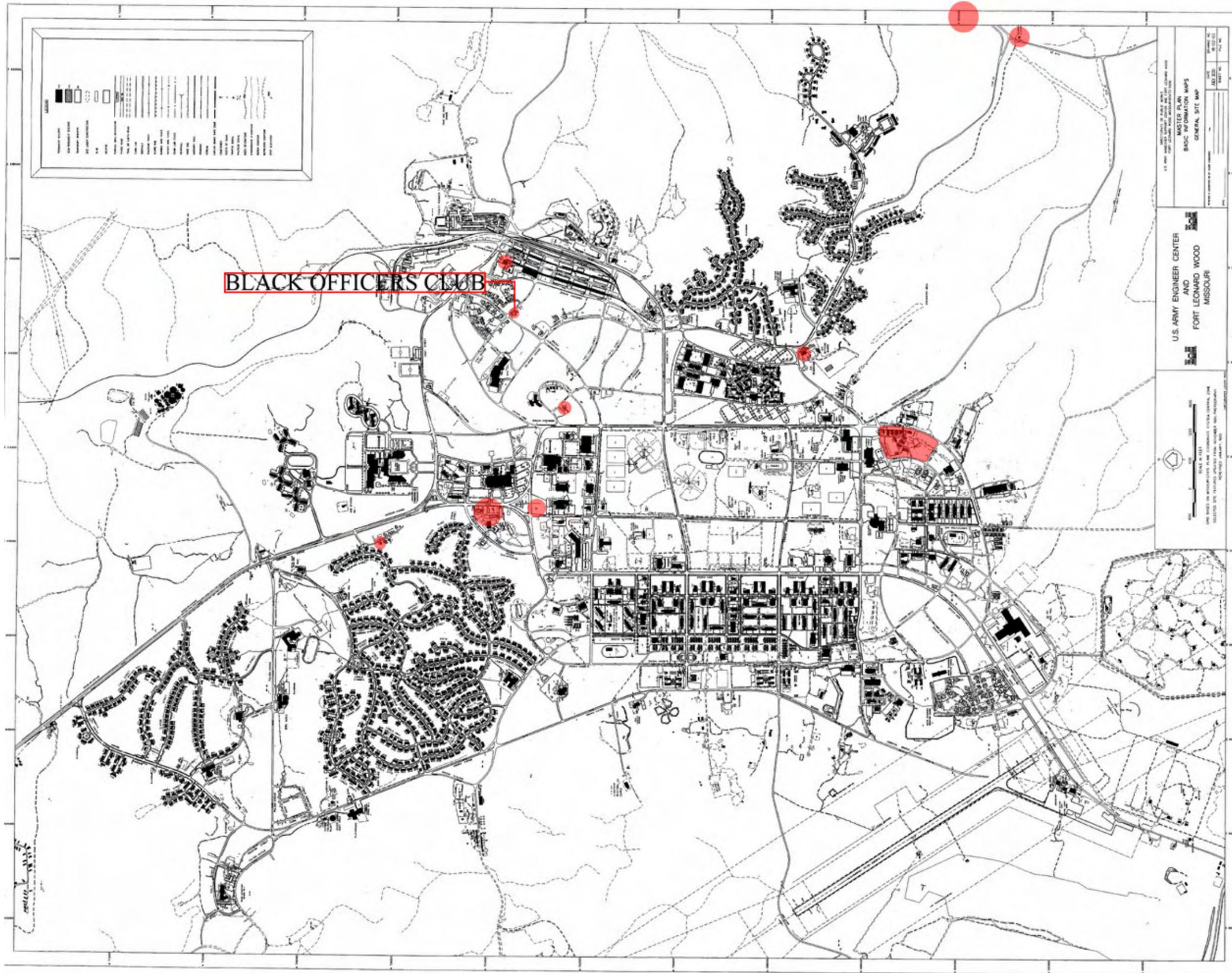


Figure 1: Fort Leonard Wood Cantonment Map with historic buildings located in red

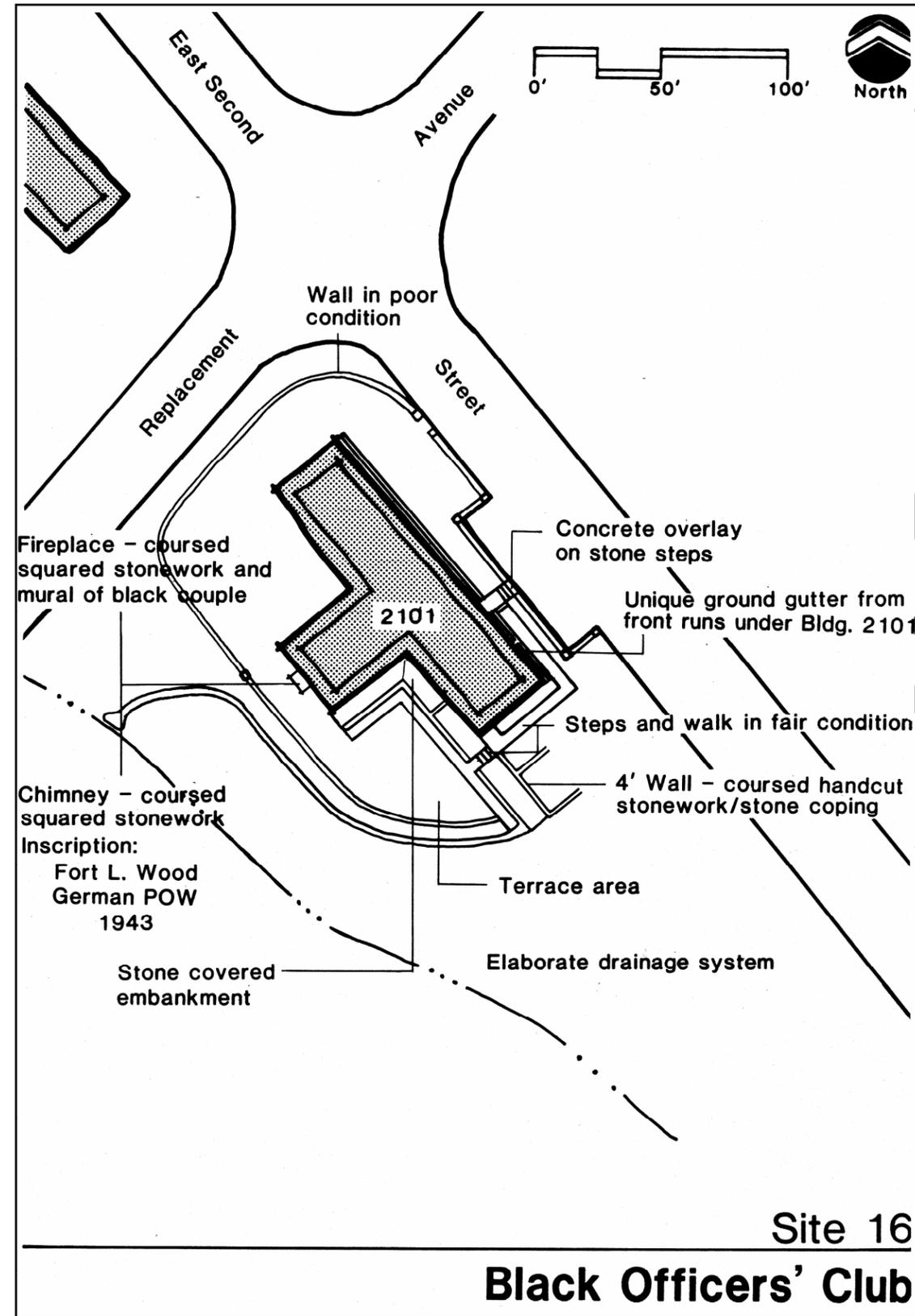
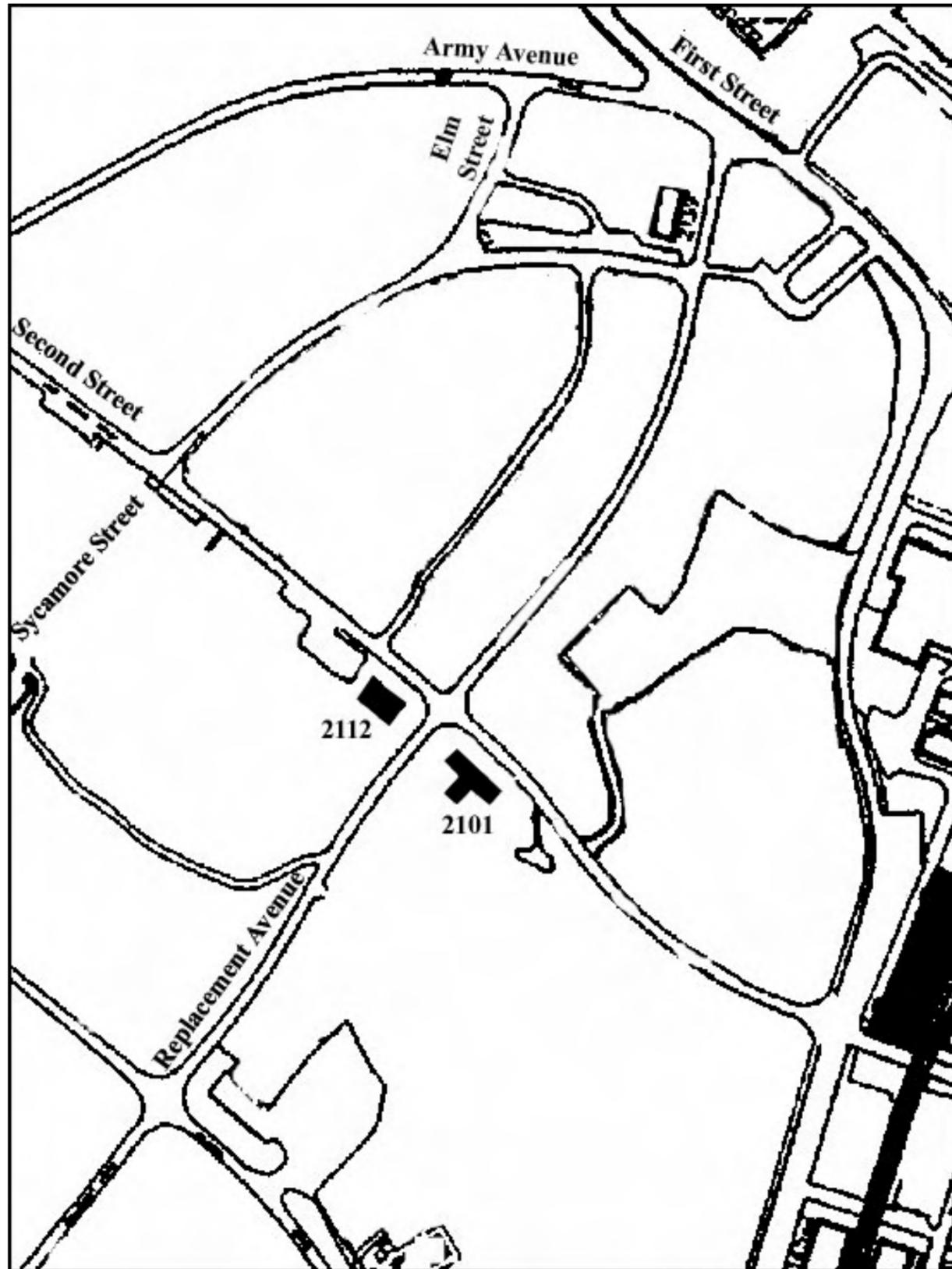


Figure 2: Fort Leonard Wood Cantonment Map locating the Black Officers' Club

## 3.0 STAGE II – BUILDING ZONES

Building zones establish the framework for planning for the operation, maintenance, and rehabilitation of an individual building by dividing the building into logical areas consistent with their use, original design, public access, and integrity. The concept of zoning, while establishing a logical framework, is also consistent with techniques of original architectural programming, design, and construction.

The zoning of the building seeks to identify the differences between more and less significant interior and exterior building areas and assigns a numerical rating, or level, to each zone. The zone ratings establish management and treatment requirements for each zone, i.e., highly significant public spaces may be in a "preservation zone" where maintenance is tightly controlled and replacements are restricted. At the other end of the spectrum, larger, more private work areas may be subject to normal maintenance and open to a much broader range of architectural modification. The treatment guidelines for each level convey the general principles of preservation to be applied within the zone.

### 3.1 SUMMARY OF ZONES:

Level 1 - Preservation Zone (Red)

Level 4 - Free Zone (White)

Level 2 - Preservation Zone (Yellow)

Level 5 - Hazardous Zone (Black Outline)

Level 3 - Rehabilitation Zone (Green)

Level 6 - Impact Zone (Red Stripes)

**The Black Officers' Club, Building 2101, has three zones:**

#### 3.1.1 LEVEL 1 - PRESERVATION ZONE

Areas, both in plan and elevation, that exhibit unique or distinctive qualities, original materials or elements, or representing examples of skilled craftsmanship, or work of a known architect or builder, or associated with a person or event of preeminent importance. Level 1 areas may be distinguished from Level 2 areas by concentrations of detailing or "richness" of finish material and detail.

EXAMPLE: Spaces or areas of a building representing the highest degree of detailing and finish level such as the main lobby or public spaces as might be found in an office building or public building, the foyer and parlors of an historic residence, the offices of the most "important" tenants within a building or space, assembly spaces such as courtroom or a library reading room, parlor etc., or the primary building facade(s), i.e., that facade which is the most visible to the public.

The building facades are generally in good shape, though the metal siding should be removed to reveal the original wood siding underneath. Then, repair, replace, and repaint original siding to properly reflect the original appearance of the building. Other areas of significance include the POW stonework, fireplace, and mural. The stonework will need to be cleared of all overgrown plantings and debris, and the fireplace should be restored to its original condition. This area is marked in red on the floor plan.

GUIDELINE: The character and qualities of this zone should be maintained and preserved as the highest priority.

#### 3.1.2 LEVEL 2 - PRESERVATION ZONE

Areas that exhibit distinguishing qualities or original materials and/or features, or representing examples of skilled craftsmanship.

EXAMPLE: Areas generally with a lower density of original materials and detailing than the primary spaces rated Level 1. These may include circulation spaces, secondary offices, smaller meeting rooms, etc., side elevations or elevations that are less subject to public view. This area is marked in yellow on the floor plan.

GUIDELINE: Every effort should be made to maintain and preserve the character and qualities of this zone.

### **3.1.3 LEVEL 6 - IMPACT ZONE**

Areas that are improperly used and may result in code violations or areas insensitively adapted, resulting in a general loss or concealment of character and/or loss or obscuring of significant historic fabric or features. Adequate existing fabric must be available to support or provide guidance for the rehabilitation of the zone and the restoration of the character of the original area.

The Black Officers' Club has been insensitively adapted using metal siding and detailing, which creates a mechanism for the deterioration of the original wood elements below. At this time we strongly suggest the removal of the metal siding and the restoration of the original wood materials beneath. These areas are striped red on the elevations.

EXAMPLE: Corridor walls constructed from non-rated materials creating potential fire hazard. Large stylistically distinctive public spaces such as a lobby or ballroom which has been subdivided into smaller spaces using full height permanent partitions and which results in loss of character, spaces which have been insensitively rehabilitated using modern materials such as pre-finished wall panels over original decorative materials, or important elevations which have been insensitively modified.

GUIDELINE: Deficiencies in this zone should be corrected and loss of character, fabric, and/or features should be mitigated where possible.

Figure 3: Building  
2101 Building Zone  
Diagram

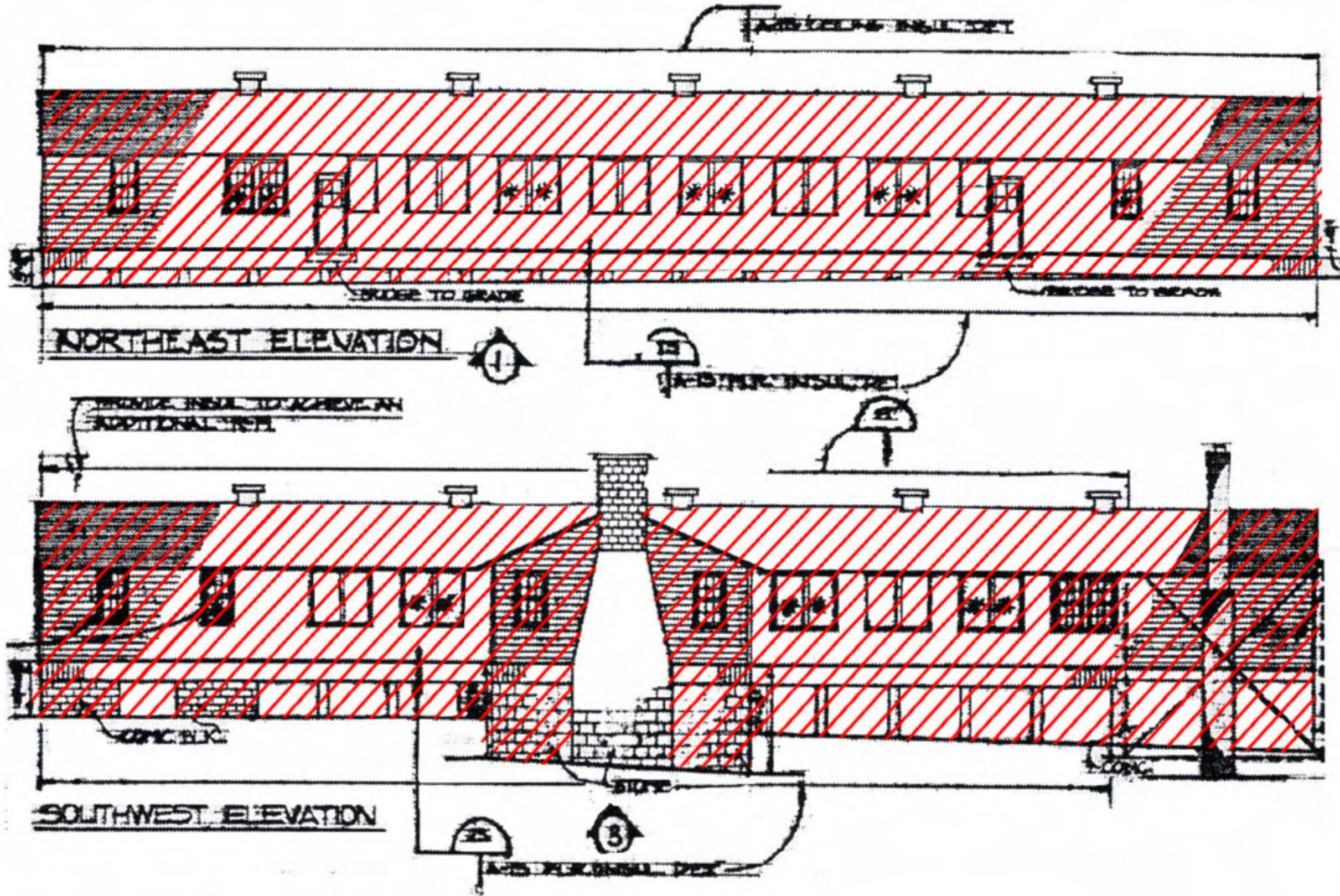


Figure 4: Building 2101  
Building Zone Diagram

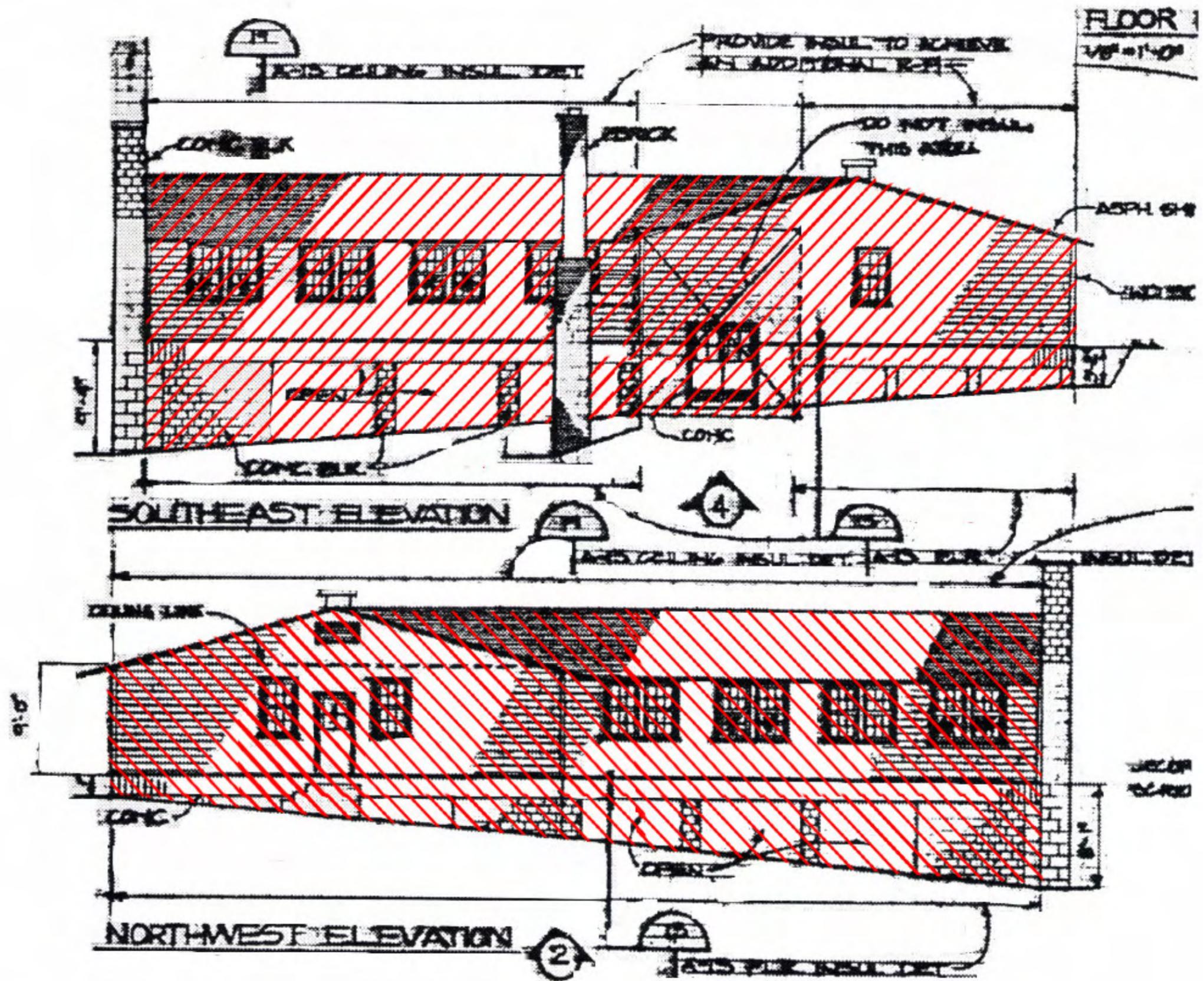


Figure 5: Building 2101 Building Zone Diagram



## 4.0 STAGE III – ELEMENT REPORT

### 4.1 GENERAL ASSESSMENT

**There are specific trouble areas for the Fort Leonard Wood buildings that should be more closely inspected, and more rigidly maintained.**

The overall condition for Fort Leonard Wood buildings is good, except where identified in the individual reports for each structure. These areas tend to allow water infiltration, which then leads to the rapid deterioration of those elements that are in direct contact with the area. Some areas, which should be regularly checked on all of the structures, include, but are not limited to, the roof corners, roof connections, and paint. These areas should be maintained strictly and checked regularly. When problems arise, the elements should be repaired as per preservation standards laid out in this manual. The areas and general problems of particular concern are:

#### 4.1.1 METAL SIDING

The metal siding not only detracts from the historic appearance of the Black Officers' Club, but also provides a mechanism for the advanced deterioration of the wood beneath. Metal siding, if not installed properly, will trap water between the interior wall and the siding. Upon initial inspection, there does not appear to be major deterioration. We do however recommend its removal in order to restore the original appearance of the building.

#### 4.1.2 POW STONEMWORK

The World War II POW stonework and mural are the primary reasons for this building's classification. Sidewalks, swales, retention walls, walls, curbs, and stairs are a few of the elements constructed by the prisoners of war during the 1940's. Most of the stonework will have to be re-laid as most areas are not level. The stones are covered in debris and overgrown plantings, are not level, and in some instances have been poorly repaired. When relaying these elements, the contractor must consult DPW and the Cultural Resources POC in order to obtain the correct mortar composition. It is important the stonework be re-laid using this mixture. This will ensure it is the same color and has the same mechanical properties as the original construction. This is absolutely necessary when undertaking this portion of the project. The stones will also need to be treated for lichen growth as noted.

#### 4.1.3 PAINT

##### All Elements:

After removal of the metal siding, the paint will most probably be deteriorated. Paint deterioration is a problem several buildings are experiencing at Fort Leonard Wood. The paint is alligatoring, peeling, and cracking caused by the natural aging of paint, or by the presence of excess moisture in the wall. These seem to be the culprits for the advanced deterioration of the wood. It is especially prominent in areas where the end grains of the wood have not been painted. This leaves the wood vulnerable to the elements. **Please refer to paint and painting guidelines for wood in the wood portion of this manual before performing any repairs.**

**NOTE:** With any replacement work at Fort Leonard Wood, first look to the Temporary District Buildings for replacement, as these elements are original to construction.

## 4.2 GENERAL INFORMATION

**Preservation: Defined as the act or process of applying measures to sustain the existing form, integrity, and material of a building or structure.**

The Element Report is the first part of the inventory and condition assessment and provides an inventory of the materials, components, and systems found within the building. The inventory and condition assessment is organized into seven categories or divisions. These include site, exterior, interior, foundation, furnishings, utilities/systems, and fire/life/health safety. An element may be an architectural feature, structural component, engineering system, or functional requirement. For each element found within the building, a number of aspects are reported:

DESCRIPTION - The description of the element provides information beyond the already descriptive name/title of the element. This can include the location on or within a building, unique characteristics, color, texture, design aspects, or whether or not the element is original.

NR RATING - This three-digit number is in reality a three component rating system. The left digit is the NR Rating as defined above in Stage I. The middle digit indicates the level of the zone within which the element can be found defined above in Stage II. The right digit is a number from 1 to 6, which rates each individual element found within the building. It is also known as the element's TREATMENT RATING.

Maintenance personnel should be particularly concerned with the specific treatments associated with each numerical value, i.e., that a #1 rated element must be preserved, or that a #3 rated element should be preserved if at all possible, but if it must be replaced, modern materials are acceptable when used in a manner sympathetic to the historic character of the building. The classification levels and corresponding treatment standards are intentionally general at the building level. Their purpose is to heighten awareness, guide management, prevent unnecessary (potentially irreversible) damage, and to promote sensitive management and maintenance. The treatment ratings for individual elements are as follows:

## 4.3 SITE

### 4.3.1 Site Description

#### 4.3.1.1 Site -- Grounds and Walking Path

NR Rating: 112

Description:

The grounds surrounding the Black Officers' Club, Building 2101, consist of stone drainage ditches along the perimeter of the building and stone retaining walls and swales at the site perimeter. The stone walls run along the outer perimeter and around the platform for the generator at the east side of the building. The stone swales begin at the outer west perimeter of the site and continue along the south side eventually leading to the stone steps on the east. Generally the terrain surrounding Building 2101 slopes toward the south. There do not appear to be any major drainage problems.



Stone work should be clear from all vegetation by lowering grade along the sides.

#### **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The site represents a substantial amount of historic fabric, and contributes to the significance and historic appearance of the Black Officers' Club as a building from the World War II period.

Condition: ***Good – Preserve***

Fair to good - Preserve

Poor - Replace

#### **Inventory Quantity and Condition**

The site is evaluated as Good when:

- the grounds are well maintained, and
- trees in contact with the facade should be cut back, as they allow for the retention of excess moisture, and
- soil and debris covering stone swales, sidewalks, and retaining walls should be cleared, and

- the front and side concrete walks are in good condition, and
- large gravel supports a soil drainage swale from the east edge of the upper parking area to the grade of the north facade of the building, and
- proper maintenance procedures including uncovering the existing stonework and repairing any mortar deficiencies need to be implemented.

**Minor deficiency of the site exists where:**

- Remove the soil and plants covering any stonework, and
- lower grade on the sides of the stone retaining walls, and
- grass and shrub should be trimmed regularly to maintain a desired height, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and
- there is a condition with long-term impact beyond 5 years.

**4.3.2 Maintenance / Management Guidelines for Site**

According to *The Secretary of Interior’s Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic site are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior’s Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior’s Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

**4.3.2.1 Identify, Retain, and Preserve**

Recommended...

- Identifying, retaining, and preserving buildings and their features as well as features of the site that are important in defining its overall historic character.
- Site features may include circulation systems such as walks, paths, roads, or parking; vegetation such as trees, shrubs, fields, or herbaceous plant material; landforms such as terracing, berms or grading; and furnishings such as lights, fences, or benches; decorative elements such as sculpture, statuary or monuments; water features including fountains, streams, pools, or lakes; and subsurface archeological features which are important in defining the history of the site.
- Retaining the historic relationship between buildings and the landscape.

Not Recommended...

- Removing or radically changing buildings and their features or site features, which are important in defining the overall historic character of the property so that, as a result, the character is diminished.
- Removing or relocating buildings or landscape features thus destroying the historic relationship between buildings and the landscape.

- Removing or relocating historic buildings on a site or in a complex of related historic structures--such as a mill complex or farm--thus diminishing the historic character of the site or complex.
- Moving buildings onto the site, thus creating a false historical appearance.
- Radically changing the grade on the property, or adjacent to a building. For example, changing the grade adjacent to a building to permit development of a formerly below-grade area that would drastically change the historic relationship of the building to its site.

#### **4.3.2.2 Protect and Maintain**

##### Recommended...

- Protecting and maintaining the building and building site by providing proper drainage to assure that water does not erode foundation walls; drain toward the building; nor damage or erode the landscape.
- Minimizing disturbance of terrain around buildings or elsewhere on the site, thus reducing the possibility of destroying or damaging important landscape features or archeological resources.
- Surveying and documenting areas where the terrain will be altered to determine the potential impact to important landscape features or archeological resources.
- Protecting, e.g., preserving in place important archeological resources.
- Planning and carrying out any necessary investigation using professional archeologists and modern archeological methods when preservation in place is not feasible.
- Preserving important landscape features, including ongoing maintenance of historic plant material.
- Protecting the building and landscape features against arson and vandalism before rehabilitation work begin, i.e., erecting protective fencing and installing alarm systems that are keyed into local protection agencies.
- Providing continued protection of masonry, wood, and architectural metals, which comprise the building and site features through appropriate cleaning, rust removal, limited paint removal, and re-application of protective coating systems.
- Evaluating the overall condition of the materials and features of the property to determine whether more than protection and maintenance are required, that is, if repairs to building and site features will be necessary.

##### Not Recommended...

- Failing to maintain adequate site drainage so that buildings and site features are damaged or destroyed; or alternatively, changing the site grading so that water no longer drains properly.
- Introducing heavy machinery into areas where they may disturb or damage important landscape features or archeological resources.
- Failing to survey the building site prior to the beginning of rehabilitation work, which results in damage to, or destruction of, important landscape features or archeological resources.
- Leaving known archeological material unprotected so that it is damaged during rehabilitation work.
- Permitting unqualified personnel to perform data recovery on archeological resources so that improper methodology results in the loss of important archeological material.

- Allowing important landscape features to be lost or damaged due to a lack of maintenance.
- Permitting the property to remain unprotected so that the building and landscape features or archeological resources are damaged or destroyed.
- Removing or destroying features from the buildings or site such as wood siding, iron fencing, masonry balustrades, or plant material.
- Failing to provide adequate protection of materials on cyclical basis so that deterioration of building and site feature results.
- Failing to undertake adequate measures to assure the protection of building and site features.

#### **4.3.2.3 Repair**

Recommended...

- Repairing features of the building and site by reinforcing historic materials.

Not Recommended...

- Replacing an entire feature of the building or site such as a fence, walkway, or driveway when repair of materials and limited compatible replacement of deteriorated or missing parts are appropriate.
- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the building or site feature or that is physically or chemically incompatible.

#### **4.3.2.4 Replace**

Recommended...

- Replacing in-kind an entire feature of the building or site that is too deteriorated to repair if the overall form and detailing are still evident. Physical evidence from the deteriorated feature should be used as a model to guide the new work. This could include an entrance or porch, walkway, or fountain. If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.
- Replacing deteriorated or damaged landscape features in-kind.

Not Recommended...

- Removing a feature of the building or site that irreparable and not replacing it, or replacing it with a new feature that does not convey the same visual appearance.
- Adding conjectural landscape features to the site such as period reproduction lamps, fences, fountains, or vegetation that is historically inappropriate, thus creating a false sense of historic development.

## 4.4 CONCRETE

### 4.4.1 Concrete Element

#### 4.4.1.1 Concrete— Drainage Ditch Base

NR Rating: 112

Description:

There are two drainage ditches for the building, the base of which are constructed of concrete. The ditch one foot away from the perimeter of the building is two feet wide with two sloping sides to guide water to the drain. The second ditch runs along the south swales and it is also about two feet wide with one sloping side to guide water to the drain.



Remove leaves from drainage ditch to ensure proper water drainage.

#### **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The drainage ditch dates to the World War II period of historic significance of the building and represents a substantial amount of historic fabric, and
- the drainage system makes a significant contribution either to the property's historic appearance or as an integral part of the buildings historic construction.

Condition: ***Good – Preserve***

Fair to good - Preserve

Poor - Replace

## Inventory Quantity and Condition

The base of the drainage ditch is evaluated as Good when:

- the ditch structure is intact, though its function of routing water is inhibited due to a build-up of organic plant matter in the ditch, and
- routine maintenance is needed to insure that the ditch continues to function as it was intended.

### Minor deficiency of the drainage ditch exists where:

- Remove leaves in the ditch to ensure clear path for proper water drainage, and
- repair any subsequent damage resulting from improper drainage, and
- standard preventive maintenance practices and building conservation methods have not been followed, and
- there is a reduced life expectancy of affected or related building materials and/or systems, and
- there is a condition with long-term impact beyond 5 years.

### 4.4.1.2 Concrete—Foundation Wall

NR Rating: 112

#### Description:

The foundation consists of an concrete monolithic pier system organized on a supporting column grid. The piers are covered with metal sheeting with louvered openings.

#### **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

#### Statement of Importance:

- The foundation wall and pier system dates to the World War II period of historic significance of the building and represents a substantial amount of historic fabric. The concrete monolithic pier system is found in a majority of the common buildings in the cantonment, and
- the foundation system makes a significant contribution either to the property's historic appearance or as an integral part of the buildings historic construction.

#### Condition: **Good – Preserve**

Fair to good - Preserve

Poor - Replace

## Inventory Quantity and Condition

The foundation system is evaluated as Good when:

- the foundation wall and supporting piers are structurally and architecturally intact, and
- the foundation wall has peeling paint in places which would need to be repaired, and
- maintenance and cleaning of the foundation piers and walls is all that is needed for it to continue to function as it was designed.

**Minor deficiency of the foundation wall exists where:**

- Inspect the material condition upon removal of the metal skirting, and
- repair concrete cracks and patch areas where the reinforcing bar and aggregate are exposed, and patch damaged sections with in-kind material finished to match existing, and
- repair damaged concrete too deteriorated to patch by cutting damaged material back to remove the source of deterioration (often corrosion of metal reinforcement bars), and
- new patch must be applied with in-kind material finished to match existing, and
- standard preventive maintenance practices and building conservation methods have not been followed, and
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

**4.4.1.3 Concrete—Porch Stoop**

NR Rating: 116

Description:

The porch stoops leading to the three building entrances are made of cast-in-place concrete. Two are located to either side of the northeast facade and one is centered on the northwest facade.

**Treatment Rating 6: SPECIFIED TREATMENT IS NOT REQUIRED**

IF ANY WORK IS DONE ON THE PORCH STOOP IT SHOULD BE SYMPATHETIC TO THE SIGNIFICANT QUALITIES OF THE HISTORIC PROPERTY.

Statement of Importance:

- The porch stoop is not original in the design of the Building 2102—Black Officers’ Club and has no historic value.

Condition: *Fair – Preserve*

Fair to good - Preserve

Poor - Replace

**Inventory Quantity and Condition**

The porch stoop is evaluated as Fair when:

- the stoop on the left side of the northeast facade is experiencing surface delamination and failure of the cement used to fill in spalled areas, yet the entry stoop on the right is in good condition, structurally intact and experiencing only rust staining from the attached metal rail, and
- the left stoop still functions, yet is currently suffering symptoms of what will become material failure in the future if not properly repaired.

**Serious deficiency of the porch stoop exists where:**

- Improper maintenance and inspection procedure has allowed significant surface deterioration to occur, and
- unless the spalled areas are repaired and the rust staining removed, the life expectancy of the concrete stoop may further decrease, and

- repair concrete cracks and patch areas where the reinforcing bar and aggregate are exposed, and patch damaged sections with in-kind material finished to match existing, and
- repair damaged concrete too deteriorated to patch by cutting damaged material back to remove the source of deterioration (often corrosion of metal reinforcement bars), and
- new patch must be applied with in-kind material finished to match existing, and
- standard preventive maintenance practices and building conservation methods have not been followed, and
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: advanced surface spalling, delamination, and rust surface discoloration from exterior source.

#### **4.4.2 Maintenance / Management Guidelines for Concrete**

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, replace them only when absolutely necessary.

The following recommendations for care of historic concrete are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

Following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

##### **4.4.2.1 Protect and Maintain**

Recommended...

- Provide proper drainage so water does not stand or accumulate.
- Clean walls only when necessary to halt deterioration or remove heavy soiling. Chemical cleaning, if utilized, should be conducted by experienced professionals.
- Tests should be conducted to determine the gentlest effective cleaning method possible; e.g., hand washing or low- to medium-pressure water cleaning. Tests should be observed over a sufficient period so that both the immediate and the long-range effects are known.

Not Recommended...

- Applying non-specified paint or other coatings such as stucco or insulation.
- Cleaning surfaces not heavily soiled.
- Cleaning without testing or without sufficient time for testing results to be of value.
- Sandblasting using dry or wet grit or other abrasive agent, high-pressure water-blasting or caustic solutions. These methods of cleaning or paint removal may permanently erode wall surface and accelerate deterioration.
- Wet cleaning when there is any possibility of freezing temperatures.

#### **4.4.2.2 Repair**

Recommended...

- Repair any cracks in concrete by sealing with specification-approved sealant.
- Patch damaged sections with in-kind material finished to match existing.

Not Recommended...

- Replacing or rebuilding a major portion of foundation wall that could be repaired.
- Patching concrete without removing the source of deterioration.
- Patching with substitute material that is physically or chemically incompatible with the original concrete.

#### **4.4.2.3 Replace**

Recommended...

- Repair damaged concrete too deteriorated to patch by cutting damaged material back to remove the source of deterioration (often corrosion of metal reinforcement bars).
- New patch must be applied with in-kind material finished to match existing.
- Replace sections too deteriorated to repair using materials compatible with the original materials.

# TYPES OF CRACKS IN CONCRETE AND TYPICAL CAUSES<sup>1</sup>

U.S. General Services Administration  
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03732-02

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

Cracks can be broadly classified as either active or dormant. If they are active, they show some movement in direction, width, or depth over a measured period. If the cracks are dormant, they remain unchanged. Some dormant cracks are of no danger, but if left unrepaired, cracks provide channels for moisture penetration, which can lead to future damage. For guidance on patching dormant cracks, see 03732-01-R "Repairing Cracks in Concrete by Injecting Epoxy Resin."

Cracks can be more specifically classified based on three factors:

1. direction
2. width
3. depth of the crack

They may be longitudinal, transverse, vertical, diagonal, or random. They may range in size from less than 1 mm (fine) to between 1 and 2 mm (medium) to over 2 mm (wide). The following are some crack classifications and a brief description.

- Pattern Cracking: Fine openings in regular pattern usually due to inconsistent volume of concrete, which is lower, near the surface.
- Checking: Shallow openings, closely and irregularly spaced.
- Hairline Cracking: Small cracks, randomly placed, in exposed areas.
- D-Cracking: Fine cracks at close intervals in a progressive random pattern.

Cracks can occur in hardened or unhardened concrete and may be caused by some of the following conditions:

- Shrinkage cracking: A crack that occurs only in unhardened concrete. It is often seen as relatively straight lines running parallel with the span of the floor.
- Plastic cracking: A type of shrinkage crack that also only occurs in unhardened concrete. It is seen as diagonal lines in the top of a slab. It is often caused by rapid drying of the surface due to delays in applying the curing membrane.
- Settlement cracking: Caused by local restraining of unhardened concrete around reinforcement or some other obstruction.
- Structural cracking: Usually a result of corrosion of the reinforcing steel or structural over stressing.
- Tension cracking: Only occurs in reinforced concrete and is caused by elongation of the reinforcement in tension zones. It is sometimes seen around columns in flat slabs and on beam soffits near the middle of a span.
- Rust cracking: The most common and most serious cause of structural cracking caused by inadequate reinforcement cover. It gradually develops at varying rates over time depending upon the degree of protection offered by the concrete cover.
- Thermally induced cracking: Results from stresses produced by temperature changes.

END OF SECTION

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<sup>1</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

# PATCHING SPALLED CONCRETE<sup>2</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**03732-04**

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## **PART 1---GENERAL**

### 1.01 SUMMARY

- A. This procedure includes guidance on patching spalls and holes in concrete with a cementitious patching material.
  
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage, and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

### 1.02 QUALITY ASSURANCE

- A. Masonry and Concrete Repair: Prepare sample panels of size indicated for each type of masonry material indicated to be patched, rebuilt, or replaced.

## **PART 2---PRODUCTS**

### 2.01 MANUFACTURERS

- A. Sika Corporation  
201 Polito Ave.  
Lyndhurst, NJ 07071  
201/933-8800
  
- B. General Polymers
  
- C. Master Builders

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<sup>2</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

## 2.02 MATERIALS

- A. Concrete Patching Material: One component, early strength, cementitious patching material "SikeTop 222 or 223" (Sika Corporation); "TPM 723" (General Polymers); "Vertipatch" (Master Builders), or approved equal.
- B. Water: Clean, free of oils, acids, alkalis, and organic matter.

## 2.03 EQUIPMENT

- A. Trowels
- B. Chisels
- C. Stiff bristle brushes (non-metallic)

## **PART 3---EXECUTION**

### 3.01 PREPARATION

- A. Protection:
  - 1. Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site, and surrounding buildings from injury resulting from masonry restoration work.
  - 2. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles, which must remain in operation during course of masonry restoration work.
  - 3. Contractor shall test those areaway drains, window well drains, etc., which will be used to assure that drains are functioning properly prior to performing masonry restoration operations in those areas. The Contractor shall report immediately to the Construction Engineer the location of drains, which are found to be stopped up, or blocked.
  - 4. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Remove immediately grout and mortar in contact with exposed masonry and other surfaces.
  - 5. Protect sills, ledges, windows, and projections from patching material droppings.

### 3.02 ERECTION, INSTALLATION, APPLICATION

- A. Remove deteriorated concrete at spalls to sound material. Grind, chisel, or saw cut deep undercut around perimeter of patch. Clean with compressed air. Thoroughly remove any concrete showing traces of oils or grease.
- B. Thoroughly wet patched area prior to casting concrete patching material. If cement patching material manufacturer recommends a different procedure, such procedure is to be followed and executed in accordance with published instructions and in accordance with approved test patch.
- C. Install cement-patching material in strict accordance with manufacturer's published instructions.
- D. Finish surface to match surface being patched, by grinding, troweling, sacking, or brushing.

### 3.03 ADJUSTING/CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water, spray applied at low pressure.
- B. Use of metal scrapers or brushes will not be permitted.
- C. Use of acid or alkali cleaning agents will not be permitted.

**END OF SECTION**

# REMOVING SURFACE DIRT FROM CONCRETE<sup>3</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**03710-15**

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

THE CLEANING OR REMOVAL OF STAINS FROM CONCRETE MAY INVOLVE THE USE OF LIQUIDS, DETERGENTS OR SOLVENTS WHICH MAY RUN OFF ON ADJACENT MATERIAL, DISCOLOR THE CONCRETE OR DRIVE THE STAINS DEEPER INTO POROUS CONCRETE. USE THE PRODUCTS AND TECHNIQUES DESCRIBED HERE ONLY FOR THE COMBINATIONS OF DIRT/STAIN AND CONCRETE SPECIFIED.

## **PART 1---GENERAL**

### 1.01 SUMMARY

- A. This procedure includes guidance on removing dirt from concrete using a detergent, chemical solvent or steam.
- B. Dirt encompasses deposits of almost any material in a location where it is not wanted, but it usually includes fine, dark-colored solid particles, often surrounded by some kind of oily film. It is particularly troublesome on architectural and decorative concrete, including exposed aggregate surfaces.
- C. Safety Precautions:
  - 1. DO NOT save unused portions of stain-removal materials.
  - 2. DO NOT store any chemicals in unmarked containers.
  - 3. EXCELLENT VENTILATION MUST BE PROVIDED WHEREVER ANY SOLVENT IS USED. USE RESPIRATORS WITH SOLVENT FILTERS.
  - 4. Whenever acid is used, the surface should be thoroughly rinsed with water as soon as its action has been adequate. Otherwise, it will continue etching the concrete even though the stain is gone.
  - 5. Provide adequate clothing and protective gear where the chemicals are indicated to be dangerous.
  - 6. Have available antidote and accident treatment chemicals where noted.
- D. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage, and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

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<sup>3</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

## **PART 2---PRODUCTS**

### **2.01 MATERIALS**

NOTE: Chemical products are sometimes sold under a common name. This usually means that the substance is not as pure as the same chemical sold under its chemical name. The grade of purity of common name substances however, is usually adequate for stain removal work, and these products should be purchased when available, as they tend to be less expensive. Common names are indicated below by an asterisk (\*).

#### **A. Hydrochloric Acid:**

1. A strong corrosive irritating acid.
2. Other chemical or common names include Chlorhydric acid; Hydrogen chloride; Muriatic acid\*; Marine acid\*; Spirit of salt\*; Spirit of sea salt\*.
3. Available from chemical supply house, drugstore, hardware store.

#### **B. Detergent:**

CAUTION: SOME DETERGENTS CONTAIN AMMONIA AND MAY REACT VIGOROUSLY WITH HYDROCHLORIC ACID.

#### **C. Clean, potable water**

#### **D. Clean white cloths or towels**

### **2.02 EQUIPMENT**

#### **A. Steam cleaning equipment**

#### **B. Stiff bristle brushes (non-metallic)**

## **PART 3---EXECUTION**

### **3.01 PREPARATION**

#### **A. Protection:**

1. Provide adequate wash solutions (i.e. water, soap, and towels) before starting the job.
2. Whenever acid is used, the surface should be thoroughly rinsed with water as soon as its action has been adequate. Otherwise, it will continue etching the concrete even though the stain is gone.

### **3.02 ERECTION, INSTALLATION, APPLICATION**

NOTE: Do not try more than one treatment on a given area unless the chemicals used from prior treatment have been washed away.

#### **A. Brush affected area with water and strong detergent.**

#### **B. Rinse the area thoroughly with clean, clear water and blot the surface dry with clean towels.**

#### **C. Repeat the treatment as necessary until the desired level of cleanliness is achieved.**

-OR-

#### **A. Mix 1 part hydrochloric acid in 19 parts water.**

#### **B. Scrub the concrete surface with this solution.**

NOTE: This is a strong method and may roughen the concrete.

- C. Rinse the area thoroughly with clean, clear water; blot the surface dry with clean towels.
- D. Repeat the treatment as necessary until the desired level of cleanliness is achieved.

-OR-

- A. Steam cleaning is generally effective and may be used in combination with proprietary materials, such as detergents for dirt removal.
- B. If there is oil present in the dirt, follow the procedure described for removing lubricating oil, see 03710-31-R "Poulticing Lubricating and Petroleum Oil Stains from Concrete."

END OF SECTION

# REPAIRING CRACKS IN CONCRETE BY INJECTING EPOXY RESIN<sup>4</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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## 03732-01

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### PART 1---GENERAL

#### 1.01 SUMMARY

- A. This procedure includes guidance on patching cracks in concrete by injecting an epoxy adhesive.
- B. Epoxy Injection should be used for DORMANT CRACKS - cracks that remain unchanged. Dormant cracks generally pose little danger. However, if left unrepaired, they will provide channels for moisture penetration.
- C. The calculated maximum crack width for concrete should not exceed 0.3 mm. Consult a professional to determine the cause for cracking and its source, as superficial repairs can aggravate the problem.
- D. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage, and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)
- E. For guidance in monitoring cracks, see 04200-02-S.

#### 1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM),  
100 Barr Drive  
West Conshohocken, PA 19428  
(610) 832-9585  
or FAX (610) 832-9555.

### PART 2---PRODUCTS

#### 2.01 MANUFACTURERS

- A. Abatron, Inc.  
5501 95th Ave.  
Kenosha, WI 53144  
800/445-1754 or 414/653-2000

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<sup>4</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at:  
<http://w3.gsa.gov/web/p/hptp.nsf>

B. Sika Corporation  
201 Polito Ave.  
Lyndhurst, NJ 07071  
201/933-8800

## 2.02 MATERIALS

### A. Epoxy Resin (Abatron, Inc., Sika Corp.), or approved equal.

#### 1. For Fine Cracks:

- a. Epoxy shall be a two-part type, low viscosity epoxy adhesive material containing 100% solids and shall meet or exceed the following characteristics when tested in accordance with the standards specified.
- b. Characteristics of Components:
  - 1) Component A - shall be a blend of modified epoxy resins.
  - 2) Component B - shall be a blend of modified amine curing agents.
- c. Test Method Requirements:
  - 1) Component A - Brookfield RVT, 700 maximum; Viscosity @ 77 +/- 3°F., cps; Spindle No. 2 @ 20 rpm.
  - 2) Component B - Brookfield RVT, 240 maximum; Viscosity @ 77 +/- 3°F, cps; Spindle No. 2.
- d. Properties of Combined Components: When mixed in the ratio of two parts Component A to one part Component B by volume, or 100 parts Component A to 44 parts Component B by weight, shall be:
  - 1) Potlife, 60g @ 77 +/- 3°F., minutes; 25 minutes maximum.
- e. Properties of the Cured Adhesive: When cured for seven days @ 77 +/- 3°F., unless otherwise specified, shall be:
  - 1) Ultimate Tensile Strength: ASTM D638; 8000 minimum.
  - 2) Compressive Yield Strength, psi: ASTM D695\*; 15,000 minimum.
  - 3) Heat Deflection Temperature: ASTM D648\*; 130 F. minimum.

NOTE: Test specimens must be cured in a manner such that the peak exothermic temperature of the adhesive does not exceed 77°F.

#### 2. For Wide Cracks:

- a. Epoxy shall be a two-part gel epoxy adhesive material containing 100% solids and shall meet or exceed the following characteristics when tested in accordance with the standards specified.
- b. Properties of Combined Components: When mixed in the ratio of two parts Component A to one part Component B by volume, or 100 parts Component A to 34 parts Component B by weight shall be:
  - 1) Potlife, 200g @ 77°F. +/- 3°F., minutes.
- c. Properties of the Cured Adhesive: When cured for seven days @ 77 degrees F. +/- 3 °F., unless otherwise specified, shall be:
  - 1) Ultimate Tensile Strength: ASTM D638; 1,500 psi minimum.
  - 2) Compressive Yield Strength: ASTM D695; 6,000 psi minimum.
  - 3) Heat Deflection Temperature: ASTM D648; 105 F. minimum.

### B. Surface Seal: (Epoxy Mortar or Oil-free Clay)

1. Description: The surface seal material is that material used to confine the injection adhesive in the joints or cracks during injection and cure.

2. Properties: The surface seal material shall have adequate strength to hold injection fittings firmly in place and to resist injection pressures adequately to prevent leakage during injection. The material shall not leave a residue upon removal.

NOTE: Provide adhesive crack fillers and other related materials that are compatible with one another and with substrates under conditions of severe weather, demonstrated by sealant manufacturer based on testing and field experience.

## 2.03 EQUIPMENT

### A. Equipment for Injection:

1. Type: The equipment used to meter and mix the two injection adhesive components and inject the mixed adhesive into the crack shall be portable, positive displacement type pumps with interlock to provide positive ratio control of exact proportions of the two components at the nozzle. The pumps shall be electric or air powered and shall provide in-line metering and mixing.
2. Discharge Pressure: The injection equipment shall have automatic pressure control capable of discharging the mixed adhesive at any pre-set pressure up to 200 psi + 5 psi and shall be equipped with a manual pressure control override. For injection of the gel epoxy, the equipment shall be equipped with the above features and be able to pump at up to 5,000 psi.
3. Ratio Tolerance: The equipment shall have the capability of maintaining the volume ratio for the injection adhesive prescribed by the manufacturer of the adhesive within a tolerance of + 5% by volume at any discharge pressure up to 200 psi. For gel epoxies, the ratio will be checked by weight at up to 5,000 psi.
4. Automatic Shut-Off Control: The injection equipment shall be equipped with sensors on both the Component A and B reservoirs that will automatically stop the machine when only one component is being pumped to the mixing head.
5. The manufacturer of the injection equipment and the manufacturer of the epoxy resin adhesive for injection shall be the same.

## PART 3---EXECUTION

### 3.01 EXAMINATION

#### A. Examine the nature and severity of the crack:

1. What direction are the cracks going and where are they the widest?
2. Note sloped floors, bulging walls and doors that do not fit.

#### B. Determine the probable cause:

1. Foundation erosion
2. Decay of materials
3. Structural failure
4. Change in materials or geometry
5. Thermal and moisture changes

#### C. Determine possible consequences if left unrepaired.

#### D. Evaluate alternative methods of repair.

#### E. For cracks associated with thermal movement, look for:

1. Horizontal or diagonal cracks near the ground at piers in long walls due to horizontal shearing stresses between the upper wall and the wall where it enters the ground.
2. Vertical cracks near the ends of walls.
3. Vertical cracks near the top and ends of the facade.
4. Cracks around stone sills or lintels: due to expansion of the masonry against both ends of the tight fitting stone piece that cannot be compressed.

### 3.02 PREPARATION

#### A. Surface Preparation:

1. Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.
2. Surfaces adjacent to joints or other areas of application shall be cleaned of dirt, dust, grease, oil, or other foreign matter detrimental to bond of epoxy injection surface seal system.
3. Entry ports shall be provided along the crack at intervals of not less than the thickness of the concrete member at that location.
4. Surface seal material shall be applied to the face of the crack or end. For through cracks, surface seal shall be applied to both faces.
5. Enough time for the surface seal material to gain adequate strength shall pass before proceeding with the injection.

### 3.03 ERECTION, INSTALLATION, APPLICATION

A. If, before repairs are made, the crack is still damp, be sure to use an epoxy appropriate for damp conditions.

B. Seal both sides of cracks with an epoxy mortar or oil-free clay, leaving small holes through which epoxy resin will be injected. 1/8" to 1/4" diameter tubing can be used to form holes. Holes should be 2"-4" long, roughly 8" apart.

C. Inject 2-component epoxy using device as provided by manufacturer.

D. Injection of epoxy adhesive shall begin at lower entry port and continue until there is an appearance of epoxy adhesive at the next entry port adjacent to the entry port being pumped.

E. When epoxy adhesive travel is indicated by appearance at the next adjacent port, injection shall be discontinued on the entry port being pumped, and epoxy injection shall be transferred to next adjacent port where epoxy adhesive has appeared.

F. Perform epoxy adhesive injection continuously until cracks are completely filled.

G. If port-to-port travel of epoxy adhesive is not indicated, the work shall immediately be stopped and the engineer notified.

H. When cracks or joints are completely filled, epoxy adhesive shall be cured for sufficient time to allow removal of injection or port sealing devices.

I. The outermost quarter inch of the crack shall be filled with a colored epoxy material of the installers' choice subject to prior approval of the **Cultural Resources POC**. The colored epoxy filler shall match the existing material, which it is filling and shall not be discernible from a distance of 15 feet.

### 3.04 ADJUSTING/CLEANING

A. Upon completion of work, remove all seal material and other residue from site. Remove and clean exposed surfaces of residue or staining resulting from this work.

END OF SECTION

## 4.5 MASONRY

### 4.5.1 Masonry Element

#### 4.5.1.1 Masonry—Fireplace—Brick

NR Rating: 112

Description:

The interior cavity of the fireplace and the hearth floor are brick finished from the base up to the flue. The fireplace is located on the south wall of the south wing of the Black Officers' Club and is located in red on the floor plan.

#### **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The brick fireplace cavity and the hearth floor contribute to the significance as they are an integral part of the historic construction of the Black Officers' Club, and
- the fireplace dates to the World War II period of historic significance of the building and represents a substantial amount of historic fabric, and
- the fireplace makes a significant contribution to the property's historic appearance.

Condition: *Good – Preserve*

Fair to good - Preserve

Poor - Replace

#### **Inventory Quantity and Condition**

The masonry is evaluated as Good when:

- the inside of the fireplace is intact and performing as originally intended, and
- the hearth floor shows heavy pitting in the masonry and mortar deterioration at the joints as well as blackened discoloration and severe efflorescence on the brick inside fireplace cavity, and
- the mortar in the hearth and fireplace interior cavity requires spot repair and repointing, and
- care should be taken to minimize future abrasive impact on the hearth surface and furniture and chairs should be moved away from the fireplace a minimum of five feet from the nearest edge of the hearth, and
- masonry should be gently cleaned according to attached specifications.

#### **Minor deficiency of the fireplace exists where:**

- Forceful impact and abrasion have damaged the surface of the bricks composing the hearth floor, and
- soot and efflorescence discolor the brick in the fireplace cavity where mortar is also missing or damaged in a few areas, and
- further abrasion of the brick on the hearth floor shall be avoided and all furniture shall be moved away from the hearth floor a minimum of five feet, and

- brick surfaces of the interior fireplace cavity shall be gently cleaned without abrasives, and
- a protective coating should be applied to the hearth floor to prevent further irreversible surface damage, and
- mortar used to repoint the interior brick cavity and the hearth floor should consist of like color, texture and mechanical properties as the original mortar, and
- standard preventive maintenance practices and building conservation methods have not been followed, and
- there is a reduced life expectancy of affected or related building materials and/or systems, and
- there is a condition with long-term impact beyond 5 years.

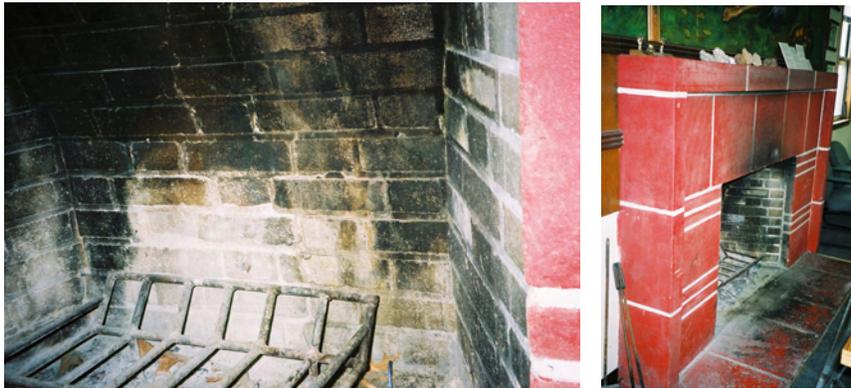
Minor deficiencies can include, but are not limited to: minor surface pitting of the brick hearth floor as a result of impact forces, localized surface delamination of the brick hearth floor, surface discoloration from use and from the brick and mortar assembly of the brick and mortar composing the fireplace cavity, and mortar deterioration in a few locations.

#### 4.5.1.2 Masonry—Fireplace —Stone

NR Rating: 112

Description:

The mantle and outer frame of the interior fireplace cavity supporting the mantle are constructed of stone with recessed mortar joints. The stone is painted red and the recess of the jointing is filled in with unpainted plaster so that the surface is flush with the stone.



The mortar in the fireplace interior cavity requires spot repair and repointing.

#### **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The stone mantle and frame contribute to the significance of the Black Officers’ Club as a building from the World War II period, and
- the fireplace dates to the World War II period of historic significance of the building and represents a substantial amount of historic fabric, and
- the fireplace makes a significant contribution to the property’s historic appearance.

Condition: *Good – Preserve*

Fair to good - Preserve

Poor - Replace

### **Inventory Quantity and Condition**

The stone for the fireplace is evaluated as Good when:

- the paint layer on the surface is undamaged, though worn in some places, and
- the mantle is discolored above the fireplace cavity and localized plaster failure where applied over mortar is evident, and
- the mantle should be gently cleaned and the areas missing plaster should be refilled with that of like color and consistency.

### **Minor deficiency of the chimney exists where:**

- Plaster over the recessed mortar joints is cracking in places, and
- stone surfaces shall be gently cleaned without the use of abrasives, and
- mortar used to repoint should consist of like color, texture and mechanical properties as the original mortar, and
- unstable areas where plaster is dusting off should be dug out to the recessed mortar joint and refilled, and
- standard preventive maintenance practices and building conservation methods have not been followed, and
- there is a reduced life expectancy of affected or related building materials and/or systems, and
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: surface cracking and missing plaster.

### **4.5.1.3 Masonry—Stone Chimney**

NR Rating: 112

#### Description:

The chimney is made of cut stones and is located on the south facade of the south wing of the Black Officers' Club. The stone is spalling near the base, which could affect the stability of the chimney. This will need to be addressed, before the condition worsens and causes a threat to those who use the building.



The stone is showing signs of age and wear. The exterior stone is spalling in areas, and the mortar is cracking.



## **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

### Statement of Importance:

- The stone chimney contributes to the significance of the Black Officers' Club as a building from the World War II period, and
- the fireplace dates to the World War II period of historic significance of the building and represents a substantial amount of historic fabric, and
- the fireplace makes a significant contribution to the property's historic appearance.

### Condition: ***Fair – Preserve***

Fair to good - Preserve

Poor - Replace

## **Inventory Quantity and Condition**

The stone chimney is evaluated as Fair when:

- spalling of the cut stone at the bottom of the chimney could affect the structural stability of the chimney, and
- there are cracks in the cut stones at various locations, and
- mildew is found on the cut stone of the north and south elevation of the chimney, and mortar used in repointing does not match existing color mortar.

### **Minor deficiency of the chimney exists where:**

- Replace cut stone with more than fifty percent surface spalling at the bottom of the chimney, and
- repair cracks in the cut stones at various locations with a mortar like in appearance and mechanical properties to that of the original mortar, and
- gently remove mildew from the cut stone of the north and south elevation of the chimney, and
- repoint mortar to match original mortar in both color and mechanical properties, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: surface spalling, cracked stone, and mildew growth.

#### 4.5.1.4 Masonry—Stone Retaining Walls

NR Rating: 112

##### Description:

The retaining walls are constructed of stones assembled using mortar bonds to form a wall. They run along the east side of Building 2101—the Black Officers’ Club and the patio. The walls are have been poorly repaired and will need some attention.



Discolored and cracked mortar should be repointed. Remove existing repaired mortar job and repoint with matching color mortar.

#### **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

##### Statement of Importance:

- The stone retaining walls contribute to the significance of the Black Officers’ Club as a building from the World War II period, and
- the stone walls date to the World War II period of historic significance of the building and represents a substantial amount of historic fabric, and
- the stone walls make a significant contribution to the property’s historic appearance.

##### Condition: *Fair – Preserve*

Fair to good - Preserve

Poor - Replace

#### **Inventory Quantity and Condition**

The retaining walls are evaluated as Fair when:

- there is moss covering 30% of the cut stone surfaces, and
- there are missing cut stones at various locations, and
- there are plants growing in between the mortar joints of the stones, and
- previously repointed mortar does not match existing color mortar and has become separated from the stones.

#### **Minor deficiency of retaining walls exists where:**

- Gently remove mildew and rust stains on the cut stone surfaces, and
- replace missing cut stones at various locations, and
- remove plants in between the joints, and
- repoint mortar to match original in both color and mechanical properties, and

- standard preventive maintenance practices and building conservation methods have not been followed, and
- there is a reduced life expectancy of affected or related building materials and/or systems, and
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: moss growth, missing elements, and poorly repointed mortar.

#### 4.5.1.5 Masonry—Stone Sidewalks

NR Rating: 112

Description:

The sidewalks are composed of cut stones assembled using mortar bonds which are flush with the stone surfaces. The sidewalks are located at the north entrances of the building and connect the building to the street.



The sidewalk stone should be cleared of all vegetation and repointed using a mortar similar in both appearance and mechanical properties to the original.

#### **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The stone sidewalks contribute to the significance of the Black Officers' Club as a building from the World War II period, and
- the sidewalks date to the World War II period of historic significance of the building and represents a substantial amount of historic fabric, and
- the stone walkways make a significant contribution to the property's historic appearance.

Condition: ***Fair – Preserve***

Fair to good - Preserve

Poor - Replace

#### **Inventory Quantity and Condition**

The sidewalks are evaluated as Fair when:

- there is mildew on the stone surfaces, and
- the stones are covered by soil, and
- the cut stones on the sidewalk are not level, and
- there are plants growing in between the cracks, and
- repointed mortar does not match existing mortar in color nor in mechanical properties.

**Minor deficiency of the sidewalks exists where:**

- Relay the cut stone sidewalk so it is level, and
- gently remove mildew on the stone surfaces, and
- gently remove soil and overgrown plantings from the surface and from between the stones, and
- repoint mortar to match original in both color and mechanical properties, and
- standard preventive maintenance practices and building conservation methods have not been followed, and
- there is a reduced life expectancy of affected or related building materials and/or systems, and
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: uneven surfaces, soil and debris covering surfaces

**4.5.1.6 Masonry—Stone Steps**

NR Rating: 112

Description:

Stone steps are located on the east side of the building and connect the patio to the north sidewalks.



Stone steps should be cleared from all leaves and sticks.

**Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The stone steps contribute to the significance of the Black Officers’ Club as a building from the World War II period, and
- the steps date to the World War II period of historic significance of the building and represents a substantial amount of historic fabric, and
- the stone steps make a significant contribution to the property’s historic appearance.

Condition: **Fair – Preserve**

Fair to good - Preserve

Poor - Replace

## Inventory Quantity and Condition

The steps are evaluated as Fair when:

- there is mildew on the stone surfaces, and
- the steps are not level, and
- there are missing stones ,and
- stones are spalling, and
- repointed mortar does not match existing mortar color nor mechanical properties.

### Minor deficiency of the steps exists where:

- Relay the cut stone steps so that they are level, and
- standard preventive maintenance practices and building conservation methods have not been followed, and
- gently remove mildew from the stone surfaces, and
- replace missing stones and spalls, and
- remove plants in between the cracks, and
- repoint mortar to match original in both color and mechanical properties, and
- standard preventive maintenance practices and building conservation methods have not been followed, and
- there is a reduced life expectancy of affected or related building materials and/or systems, and
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: uneven surfaces, mildew growth, missing elements, and debris covering surfaces.

### 4.5.1.7 Masonry—Stone Swales

NR Rating: 112

Description:

The swale is located along the south facade and the outer perimeter of the property on the south and west facades.



Mortar used to repoint does not match original in neither appearance nor mechanical properties.

**Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The stone swales contribute to the significance of the Black Officers' Club as a building from the World War II period, and
- the swales date to the World War II period of historic significance of the building and represents a substantial amount of historic fabric, and
- the stone swales make a significant contribution to the property's historic appearance.

Condition: **Fair – Preserve**

Fair to good - Preserve

Poor - Replace

**Inventory Quantity and Condition**

The swales are evaluated as Fair when:

- there is mildew and rust stain on the stone surfaces, and
- the stones are covered by soil, overgrown plants, and debris, and
- several stones are missing, and
- repointed mortar does not match the original neither in appearance nor mechanical properties.

**Minor deficiency of the swales exists where:**

- Treat stones for mildew growth, and
- gently remove soil and debris from stone surfaces as well as between stones, and
- replace all missing stones, and
- repoint mortar to match original in both color and mechanical properties, and
- standard preventive maintenance practices and building conservation methods have not been followed, and
- there is a reduced life expectancy of affected or related building materials and/or systems, and
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: uneven surfaces, improperly repointed mortar, and soil and debris covering surfaces

**4.5.2 Maintenance / Management Guidelines for Masonry**

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic site are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>.

### **4.5.2.1 Identify, Retain, and Preserve**

Recommended...

- Identifying, retaining, and preserving masonry features that are important in defining the overall historic character of the building such as walls, brackets, railings, cornices, window architraves, door pediments, steps, and columns; and details such as tooling and bonding patterns, coatings, and color.

Not Recommended...

- Removing or radically changing masonry features which are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Replacing or rebuilding a major portion of exterior masonry walls that could be repaired so that, as a result, the building is no longer historic and is essentially new construction.
- Applying paint or other coatings such as stucco to masonry that has been historically unpainted or uncoated to create a new appearance.
- Removing paint from historically painted masonry.
- Radically changing the type of paint or coating or its color.

### **4.5.2.2 Protect and Maintain**

Recommended...

- Protecting and maintaining masonry by providing proper drainage so that water does not stand on flat, horizontal surfaces or accumulate in curved decorative features.
- Cleaning masonry only when necessary to halt deterioration or remove heavy soiling.
- Carrying out masonry surface cleaning tests after it has been determined that such cleaning is appropriate. Tests should be observed over a sufficient period of time so that both the immediate and the long range effects are known to enable selection of the gentlest method possible.
- Cleaning masonry surfaces with the gentlest method possible, such as low pressure water and detergents, using natural bristle brushes.
- Inspecting painted masonry surfaces to determine whether repainting is necessary.
- Removing damaged or deteriorated paint only to the next sound layer using the gentlest method possible (e.g., hand scraping) prior to repainting.
- Applying compatible paint coating systems following proper surface preparation.
- Repainting with colors that are historically appropriate to the building and district.
- Evaluating the overall condition of the masonry to determine whether more than protection and maintenance are required, that is, if repairs to the masonry features will be necessary.

Not Recommended...

- Failing to evaluate and treat the various causes of mortar joint deterioration such as leaking roofs or gutters, differential settlement of the building, capillary action, or extreme weather exposure.
- Cleaning masonry surfaces when they are not heavily soiled to create a new appearance, thus needlessly introducing chemicals or moisture into historic materials.

- Cleaning masonry surfaces without testing or without sufficient time for the testing results to be of value.
- Sandblasting brick or stone surfaces using dry or wet grit or other abrasives. These methods of cleaning permanently erode the surface of the material and accelerate deterioration.
- Using a cleaning method that involves water or liquid chemical solutions when there is any possibility of freezing temperatures.
- Cleaning with chemical products that will damage masonry, such as using acid on limestone or marble, or leaving chemicals on masonry surfaces.
- Applying high pressure water cleaning methods that will damage historic masonry and the mortar joints.
- Removing paint that is firmly adhering to, and thus protecting, masonry surfaces.
- Using methods of removing paint which are destructive to masonry, such as sandblasting, application of caustic solutions, or high pressure water blasting.
- Failing to follow manufacturers' product and application instructions when repainting masonry.
- Using new paint colors that are inappropriate to the historic building and district.
- Failing to undertake adequate measures to assure the protection of masonry features

#### **4.5.2.3 Repair**

Recommended...

- Repairing masonry walls and other masonry features by repointing the mortar joints where there is evidence of deterioration such as disintegrating mortar, cracks in mortar joints, loose bricks, damp walls, or damaged plasterwork.
- Removing deteriorated mortar by carefully hand-raking the joints to avoid damaging the masonry.
- Duplicating old mortar in strength, composition, color, and texture.
- Duplicating old mortar joints in width and in joint profile.
- Repairing stucco by removing the damaged material and patching with new stucco that duplicates the old in strength, composition, color, and texture.
- Using mud plaster as a surface coating over unfired, unstabilized adobe because the mud plaster will bond to the adobe.
- Cutting damaged concrete back to remove the source of deterioration (often corrosion on metal reinforcement bars). The new patch must be applied carefully so it will bond satisfactorily with, and match, the historic concrete.
- Repairing masonry features by patching, piecing-in, or consolidating the masonry using recognized preservation methods. Repair may also include the limited replacement in-kind--or with compatible substitute material--of those extensively deteriorated or missing parts of masonry features when there are surviving prototypes such as terra-cotta brackets or stone balusters.
- Applying new or non-historic surface treatments such as water-repellent coatings to masonry only after repointing and only if masonry repairs have failed to arrest water penetration problems

Not Recommended...

- Removing non-deteriorated mortar from sound joints, then repointing the entire building to achieve a uniform appearance.
- Using electric saws and hammers rather than hand tools to remove deteriorated mortar from joints prior to repointing.
- Repointing with mortar of high portland cement content (unless it is the content of the historic mortar). This can often create a bond that is stronger than the historic material and can cause damage as a result of the differing coefficient of expansion and the differing porosity of the material and the mortar.
- Repointing with a synthetic caulking compound.
- Using a "scrub" coating technique to repoint instead of traditional repointing methods.
- Changing the width or joint profile when repointing.
- Removing sound stucco; or repairing with new stucco that is stronger than the historic material or does not convey the same visual appearance.
- Applying cement stucco to unfired, unstabilized adobe. Because the cement stucco will not bond properly, moisture can become entrapped between materials, resulting in accelerated deterioration of the adobe.
- Patching concrete without removing the source of deterioration.
- Replacing an entire masonry feature such as a cornice or balustrade when repair of the masonry and limited replacement of deteriorated or missing parts are appropriate.
- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the masonry feature or that is physically or chemically incompatible.
- Applying waterproof, water repellent, or non-historic coatings such as stucco to masonry as a substitute for repointing and masonry repairs. Coatings are frequently unnecessary, expensive, and may change the appearance of historic masonry as well as accelerate its deterioration.

#### **4.5.2.4 Replace**

Recommended...

- Replacing in-kind an entire masonry feature that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence as a model to reproduce the feature. Examples can include large sections of a wall, a cornice, balustrade, column, or stairway. If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

Not Recommended...

- Removing a masonry feature that is irreparable and not replacing it; or replacing it with a new feature that does not convey the same visual appearance.

# REPOINTING MASONRY USING LIME MORTAR<sup>5</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**04520-02**

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## **PART 1---GENERAL**

### 1.01 SUMMARY

- A. This procedure includes guidance on repointing stone masonry using lime mortar.
- B. Repointing is the process of removing deteriorated mortar from a masonry joint and replacing old mortar with new, sound mortar.
- C. This process is sometimes referred to as "tuck pointing", though "tuck pointing", is actually a decorative treatment rather than a method of repair. True tuck pointing is the process of adding a finish layer of mortar, occasionally tinted, to the outer portion of a newly laid joint.
- D. Major reasons for mortar joint failures include:
  - 1. Weathering action,
  - 2. Settling,
  - 3. Temperature cycles,
  - 4. Poor original design and materials, and
  - 5. Lack of exterior maintenance.
- E. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)
- F. For guidance on preparing lime mortar, see 04100-03-S.

### 1.02 SUBMITTALS

- A. Manufacturers' literature describing packaged items.
- B. Source and screen analysis of bulk aggregate.
- C. Mortar sample: Submit, for verification and approval, a sample of each type of mortar used, in form of 6" long by 1/2" wide sample strips of mortar set in aluminum or plastic channels.
  - 1. Provide record of mortar mix, composition and field procedures to be followed.

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<sup>5</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at:  
<http://w3.gsa.gov/web/p/hptp.nsf>

### 1.03 QUALITY ASSURANCE

#### A. Mock-ups: Raking and Repointing Sample Work:

1. Test/Sample Area and THE CULTURAL RESOURCES POC Approval:
  - a. Initially perform sample joint raking and repointing on each of a 100 sq. ft. test of stone, brick, and terra cotta areas as approved by THE CULTURAL RESOURCES POC.
  - b. Demonstrate proficiency with joint raking tools and ability to not damage masonry units with either hand or power tools.
  - c. Mix and cure test batch of repointing mortar and place in joints; repeat test mix until mortar color is approved. Test mortar should be matched, dried and approved before placing in joints.
  - d. Demonstrate workmanship of repointing procedures and joint finishing.
  - e. Gain written approval from THE CULTURAL RESOURCES POC for test area before proceeding with remaining work.
2. Joint Raking Method: Rake joints by hand ONLY using special joint cleaning chisels and hammer.
3. Repointing Method: Repoint joints by hand ONLY using approved pointing trowels. NO "BAGGING" OR CAULKING GUN POINTING METHODS APPROVED.

### 1.04 PROJECT/SITE CONDITIONS

- #### A. Environmental Conditions:
- Perform repointing only when the temperature is between 40° Fahrenheit and 80° Fahrenheit. If the temperature is below 40° the mortar sets too slowly, and there is a good chance of freezing before it fully sets. If the temperature is above 80°, the mortar will set too quickly, and there is a strong chance of excessive loss of water prior to adequate setting.

## **PART 2---PRODUCTS**

### 2.01 MANUFACTURERS

- #### A. Repointing Tools: Available from good hardware stores, building material suppliers or mail-order catalogues.
1. The Stanley Gold-blatt Tool Co.  
511 Osage Ave.  
Kansas City, KS 66105-2198  
913/621-3010
  2. Marshalltown Trowel Co.  
P.O. Box 738  
Marshalltown, IA 50158  
515/753-5999
  3. Masonry Specialty Co.  
4430 Gibsonia Rd.  
Gibsonia, PA 15044  
412/443-7080

### 2.02 MATERIALS

- #### A. Lime mortar (See 04100-03-S for materials and procedures in preparing lime mortar)
- #### B. Clean, potable water

### 2.03 EQUIPMENT

- #### A. Trowels: range in length from 10-12 inches

- B. Chisels:
  1. Joint chisels or a standard mason's chisel with a 1-1/2" blade and a long narrow handle
  2. Floor chisels
- C. Hammers:
  1. 5# stone dressing hammer
  2. 2# striking hammer
  3. "No-Bounce" hammer
  4. Full size and one half size brick hammers
- D. Joint Tools: (see 2.01 MANUFACTURERS above)
  1. 3/8"-1/4" raised beaded tool
  2. 3/8"-1/4" beaded striking tool
  3. 1/2" raised beaded tool with offset handle
  4. 1/2" flat joint iron
  5. Pointing tool should be about 1/16" narrower than the joint being filled to achieve good compaction
- E. Hawks: Plywood or steel hawk (mortar board)
- F. Brushes:
  1. Natural bristle brushes
  2. Stiff bristle brushes (no wire)
- G. Spray bottle

## 2.03 MIXES

- A. See 04100-03-S for lime mortar mixes

## PART 3---EXECUTION

### 3.01 EXAMINATION

- A. Examine all existing exterior mortar joints. If the answer to any of the following questions is yes, then the building's joints are deteriorated and need repointing:
  1. Are mortar joints eroded back more than 1/4" from the masonry face?
  2. Are there cracks running vertically or horizontally through the mortar?
  3. Are mortar bonds broken or pulled away from the masonry?
  4. Has mortar fallen out of joints?
  5. Is mortar excessively soft, powdery or crumbling?
  6. Is pointing badly-stained?
- B. Typical exterior damage due to mortar deterioration includes open joints, efflorescence, spalling and loosened masonry units.
- C. Typical interior damage due to mortar deterioration includes failing plaster and stained wall paper.
- D. A professional pointer experienced in old masonry is required for any of the following areas or conditions:
  1. Chimneys need repointing
  2. Window lintels must be rebuilt
  3. Masonry is loose or missing
  4. Work must be done from scaffolds or extension ladders
  5. The original mortar joints were "beaded"-tooled with a raised, round-profiled joint that projects out from the wall

### 3.02 PREPARATION

#### A. Preparing the Joints:

1. Clean area of loose dirt and debris using a stiff bristle brush and remove all extraneous fastenings and devices.
2. Install necessary protection of adjacent building materials, property and persons from joint cleaning work and dirt.
3. Control dust and dirt from raking work; dampen area being worked; and use curtains to limit spread of dust from joint raking and cutting operations.

#### B. Joint Cutting and Raking:

1. Cut and rake old mortar from existing joints by hand using a hammer and chisel. NOTE: POWER CHISELS AND POWER SAWS SHOULD NOT BE USED.
2. Place the chisel in the center of the joint and pound it with a striking hammer or "No-Bounce" hammer until the mortar disintegrates.
3. Rake out the loose material to a depth of about 1 inch and never to a depth less than their width. Leave a clean, square face at the back of the joint to provide optimum contact with the new mortar.

CAUTION: AVOID OVER CUTTING ENDS OF VERTICAL JOINTS, WIDENING JOINTS OR CUTTING INTO BEDDING FACES OF MASONRY UNITS.

4. While raking out joints, remove all metal fittings such as nails, brackets and clips on both horizontal and vertical surfaces.
5. Carefully clean out the prepared face with a soft or stiff bristle brush, or blow the joints clean with low-pressure compressed air (40-60 psi).
6. Thoroughly flush out joint with clean, clear water.

### 3.03 ERECTION, INSTALLATION, APPLICATION

#### A. Filling Joints:

1. Dampen masonry surfaces and joints to control suction and evaporation before placing repointing mortars.

NOTE: There should be no free water present which may cause voids in the mortar.

2. Using a pointing tool, push the mortar into the joint from a board and iron with the maximum possible pressure; The mortar should be applied in layers, each to a maximum thickness of 3/8".

NOTE: The pointing tool should be about 1/16" narrower than the joint being filled to achieve good compaction. In some cases, the joints will be so thin that a standard pointing tool will need to be ground down to fit the joint.

3. Thoroughly compact each layer of mortar and allow to set until thumb-print hard before applying the next layer of mortar.
4. Fill the joints so that they are slightly recessed from the masonry face. Avoid leaving a joint which is visually wider than the actual historical appearance.
5. Continuously keep all excess and spilled mortar brushed off the faces of masonry units, ledges and other surfaces before it sets or stains the work.

#### B. Joint Finishing:

1. Begin when mortar attains "thumb print" hardness.
2. Tool the joint to match the old mortar.

NOTE: It is important to tool the joint at the right stage; if the joint is too soft, the color will be lighter than expected and hairline shrinkage cracks are likely to occur; if the joint is too hard when tooled, dark streaks may appear (tool burning) and good closure of the mortar against the masonry will not be achieved. Excessive tooling may bring lime and fine aggregates to the surface, creating a visual change in texture and a surface subject to early deterioration.

3. To produce a roughened texture, lightly spray the mortar with water after the initial set, stipple the mortar with a stiff bristle brush or dab the mortar with coarse sacking.
4. Protect finished work from direct sun and rain until the face has dried and hardened.

### 3.04 ADJUSTING/CLEANING

#### A. Cleaning Up:

1. Use masking and drop cloths to prevent mortar stains on adjacent work and ledges.
2. Keep work areas clean and free from mortar drips, spills and residue of waste mortars or wash-off.
3. Clean off excess mortar as work proceeds using masonry brushes before mortar sets.
4. Wash completed repointing work when finished mortar joints are set with clean water and masonry brushes, scrubbing only as required to clean mortar stains off masonry without scouring the units and joint faces.
5. Do not use acid or detergent cleaning agent to aid mortar removal and clean-up without written approval from THE CULTURAL RESOURCES POC.

#### B. Curing:

1. Schedule work only when moderate weather is forecast.
2. Protect completed work from adverse weather, heavy rainfall, freezing, and drying by direct sunlight and winds until cured.
3. Sprinkle or mist repointed work as required to achieve cure in mortar joints for a minimum of 72 hours after completion.
4. Lime Mortar: Cures by drying and crystallization, not by hydration; and can be washed out of joints if not protected before it cures.

#### C. Final Cleaning:

1. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water spray applied at low pressure.

NOTE: Use of metal scrapers or brushes is not permitted. Use of acid or alkali cleansing agents is not permitted.

- D. Some efflorescence, called new construction "bloom," occasionally appears on the surface within the first few months following a repointing project. These deposits normally are harmless and are removed by the natural washing of the rain. If not removed by natural weathering, they can be removed with dry brushing with a bristle brush. The use of chemical cleaners to remove this type of efflorescence normally is not necessary; AVOID USING ACIDS, PARTICULARLY MURIATIC ACID.

END OF SECTION

# PREPARING LIME MORTARS FOR REPOINTING MASONRY<sup>6</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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## 04100-03

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### PART 1---GENERAL

#### 1.01 SUMMARY

- A. This standard includes guidance on preparing lime mortars for repointing masonry.
- B. Lime mortars are preferable to portland cement mortars for repointing historic masonry:
  - 1. Lime mortars are more permeable by water. Water passing through lime mortar will dissolve a small portion of the lime and then will deposit it in hairline cracks as the water evaporates.
  - 2. Lime mortars expand slightly during setting, and resists shrinkage which causes cracking.
  - 3. Lime mortars are more durable than generally recognized.
- C. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

#### 1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM), 100 Barr Drive, West Conshohocken, PA 19428, (610) 832-9585 or FAX (610) 832-9555.

#### 1.03 DELIVERY, STORAGE AND HANDLING

- A. Storage and Protection: Lime and cement must be protected from rainwater and ground moisture, as water vapor in the air can begin the setting process. Other materials also should be protected from contamination.

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<sup>6</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at:  
<http://w3.gsa.gov/web/p/hptp.nsf>

## **PART 2---PRODUCTS**

### **2.01 MATERIALS**

NOTE: The use of standard specifications for materials, such as those developed by the ASTM, provides an easily referenced level of quality.

- A. Lime: Should conform to ASTM C207, Type S, high plasticity, Hydrated Lime for Masonry Purposes.
  - 1. Lime which meets this standard will "work" well, resists drying during curing, and is sufficiently strong for the purpose of repointing.
  - 2. Lime expands as it hydrates, making high lime mortars more resistant to crack formation.
  
- B. Cement: Should conform to ASTM C150, Type I, White. It should not have more than 0.60% alkali nor more than 0.15% water soluble alkali. Use gray portland cement ONLY if a dark mortar is to be matched.
  - 1. Cement meeting this standard should increase the workability of the mortar, accelerate the setting time and slightly increase the strength of the mortar.
  - 2. The low alkali content will prevent efflorescence.
  
- C. Sand: Free of impurities and conforming to ASTM C144.
  - 1. Sand color, size, and texture should match the original as closely as possible. Provide a sample of the sand for comparison to the original, and have it approved by THE CULTURAL RESOURCES POC before beginning repointing work.
  - 2. When possible, use bar sand or beach sand rather than crushed sand for the repointing mortar.
    - a. Crushed sand has sharp edges, which makes it more "sticky" and difficult to work into the joints.
    - b. Bar sand, on the other hand, has rounded edges and flows easily during the mortar application.
    - c. The working characteristics of mortar made with crushed sand may be improved by adding a slight amount of portland cement. The amount of cement should be determined by experimentation, but should not exceed 20% of the total lime/cement binder. 20% OR LESS OF CEMENT HAS MINIMAL EFFECT ON THE HARDNESS OF THE MORTAR. CEMENT CONTENT ABOVE 20% WILL MAKE THE MORTAR TOO HARD.

NOTE: Bar sand or beach sand should be washed to remove the salts before using.

- D. Clean, potable water: If the water must be transported or stored in a container, the container must not impart any chemicals to the water.
  
- E. Stone dust finely ground from the same stone as that to be repointed.
  
- F. Additives: NO antifreeze compounds or other admixture shall be used.

NOTE: Do not use anti-freeze compounds. These compounds are designed for use with cement mortars, and their effectiveness with high lime mortars is questionable. Furthermore, the compounds contain salts which can lead to serious problems in the masonry at a later time.

NOTE: Air entraining agents are not recommended. These agents are designed for use with cement rather than lime, and they result in decreased bonding of the mortar and the masonry. Air entraining is not necessary with high lime mortars because of the natural ability of these mortars to flex with temperature changes.

## 2.02 EQUIPMENT

- A. Surface temperature thermometer - can be either mechanical (less expensive but must be calibrated often) or digital electronic
- B. Wooden mortar boxes
- C. Hoe
- D. Mesh screen
- E. Hawks: Plywood or steel hawk (mortar board)

## 2.03 MIXES

- A. Some factors to consider when mixing lime mortar include durability, color and texture, and workability.
  - 1. Durability: Repointing mortar should be softer than the masonry units and the original mortar to reduce stresses at the edge of the masonry and, in the case of lime mortar, to reduce shrinkage which can cause cracks in the mortar.
    - a. If the new mortar is harder than the masonry or the original mortar, it can cause serious stresses within the wall during thermal expansion and contraction, which can lead to deterioration of the masonry units rather than the mortar.
    - b. If the mortar is softer, any deterioration which occurs will take place in the mortar, which is easier to replace than the units themselves.
  - 2. The repointing mortar should allow the passage of water, both liquid and vapor. If the mortar does not allow water to pass freely through it, the water can become trapped inside the wall, freeze and cause serious deterioration to the masonry.
  - 3. Color and texture: The repointing mortar should match the original mortar in color, texture and physical characteristics.
    - a. Obtaining an accurate color match is best achieved by selecting an appropriate sand.
      - 1. Use sand which is similar to the original in color and gradation. Sand from more than one source may be required.
      - 2. For repointing of natural stones, use finely ground stone "dust" in the mortar to match the joints as closely as possible to the stone.
    - b. If the original mortar was tinted, or if it is impossible to obtain a color match through the use of sand, it may be necessary to use a special mortar pigment.

CAUTION: PIGMENTS MAY REACT WITH OTHER INGREDIENTS IN THE MORTAR TO FORM EFFLORESCENCE. THEY MAY ALSO WEATHER AT A DIFFERENT RATE THAN NATURAL COLORING AND CAUSE A COLOR VARIATION IN THE MORTAR.

NOTE: If pigments must be used, pure mineral oxides should be used because they do not fade or leach out of the mortar. Amount of pigment should not exceed 2% of the mortar mix by the weight.

- c. Many mortars used before the twentieth century have small lumps of incompletely burned or ground lime, or other impurities. To match the original appearance of the masonry, these impurities must be included in the new repointing mortar. Use identical materials, such as ground oyster shells (obtained at feed stores) or lumps of lime, to duplicate original lumps.
- 4. Workability: The workability or plasticity of the mortar is a direct result of the selection of materials.

B. Mortar Mix:

1. Have the existing mortar completely analyzed to insure that the repointing mortar will not be less permeable/harder than the masonry units or the original mortar. IT IS BETTER TO HAVE MORTAR THAT IS MORE PERMEABLE THAN LESS.
2. Measure all ingredients by cubic volume using a pre-established uniform measure, such as a small bucket, rather than a less uniform measure such as a shovel.
3. For historic masonry set in lime mortar, use the following mortar mix:

1 part portland cement  
3 parts lime  
8-12 parts sand (To match existing mortar as closely as possible.)

NOTE: The exact mix required will relate to the grain size and sharpness of the sand and will vary depending on the supply.

-OR-

For historic masonry set in standard mortar, use the following mortar mix (ASTM C270 Type "0") as a starting point:

1 part portland cement  
2 parts lime or lime putty  
6 to 9 parts sand and stone dust (To match existing mortar as closely as possible.)

-OR-

For Limestone (ASTM C270 Type "N"):

1 part portland cement  
1 parts lime  
4-6 parts aggregate  
Enough water to form a workable consistency

-OR-

For Granite (ASTM C270 Type "S"):

2 parts portland cement  
1 part lime  
7-9 parts aggregate  
Enough water to form a workable consistency

NOTE: For deteriorated granite walls or granite walls indicating movement, use ASTM C270 type "N" as listed above for limestone.

4. Mix a final "job-size" batch once the correct sand color, cement content, etc. have been determined through small tests to ensure the on-site mixing conditions will result in the same final product.

## **PART 3---EXECUTION**

### **3.01 ERECTION, INSTALLATION, APPLICATION**

#### **A. Mix Hydrated Lime:**

1. Add dry bagged hydrated lime to water. Stir and hoe the mass to form a thick cream.
2. Allow to stand at least 24 hours before use.

#### **B. Prepare Roughage Premix (for later use):**

1. Accurately proportion the sand and lime using measuring boxes constructed to contain the exact volume of each ingredient required to make on batch.
2. Mix sand and lime thoroughly for about ten minutes. Store in plastic-lined drums and seal until required.

NOTE: This compound may be stored indefinitely if kept sealed from air and kept from freezing.

3. When required for use, add and mix the correct portion of gauging cement as specified and use immediately. **ACCURATE PORTIONING IS VERY IMPORTANT.**

#### **C. Add cements to lime and aggregate mixes immediately before the use of the mortar.**

1. Perform all batching with wooden boxes or plastic pails of known volume to ensure standardization and conformity of measurement; **SHOVEL MEASUREMENT OF MATERIALS IS NOT PERMITTED.**
2. Use box sizes that are sufficient for producing a batch size equal to one mixer load.

NOTE: Mix dry ingredients thoroughly before adding any water (approximately five minutes).

#### **D. Add a small amount of water so that the mortar is just wet enough to hang on a trowel.**

NOTE: Excess water will cause shrinkage and too little water will retard carbonation. Record the amount of water added so that it may be used as a guide for future batches.

#### **E. Mix mortars at least 10 minutes before using to improve workability and ensure thorough mixing.**

NOTE: Automatic mixers should have rubber blades. Clean mixing boards and mixing machines thoroughly after each use to prevent hardened lumps of mortar from containing the next batch of mortar.

1. Repointing mortars may sit 1-2 hours after initial mixing and then may be remixed to a workable consistency. This is done to reduce shrinkage.
2. Test the mix by holding a trowel with mortar on it upside down and shaking it once.
  - a. If the mortar falls off without shaking, it has too much sand.
  - b. If more than one shake is required, the mortar is too sticky or "plastic" and the lime content must be decreased.

#### **F. Coloring Mortars:**

1. Take samples of freshly-broken mortar from the original masonry pointing. Note color of aggregate for color-matching. **DO NOT TRY TO MATCH THE COLOR OF THE BINDER.**

NOTE: Use unweathered, unsoiled samples only.

2. Prepare test patties of mortar approximating the inner color of the sample and set aside to dry for at least 72 hours. Drying time may be accelerated by placing the patty sample in an oven or over a hot-plate.
3. Break the sample test patties and compare the inner portions to the original.
4. See Section 2.03 above for additional information on coloring mortars.

G. Use repointing mortar within approximately 1-2 hours of final mixing. Retemper the mortar as necessary to maintain workability.

NOTE: Retempering is permitted to maintain workability. Remixing is not permitted. Add water at the mortar-board using a spray bottle to replace only water lost through evaporation.

NOTE: Use all mortar within two hours of gauging; throw out left over mortar; do not re-temper or remix mortars after this time has elapsed.

NOTE: This time limit may vary depending upon the outside temperature (longer on cooler days and shorter on warmer days.)

H. For guidance on repointing, see 04520-02-R.

END OF SECTION

## 4.6 METAL

### 4.6.1 Metal Element

#### 4.6.1.1 Metal—Fascia

NR Rating: 115

Description:

A painted metal fascia covers the original wood fascia. This repair was made at the time the siding was covered. All metal siding, fascia, and endcaps should be removed to reveal the original wood underneath. This wood will then need to be treated as per preservation standards; repaired as needed, replaced where beyond repair, cleaned, scraped, primed and repainted to restore the original historic appearance of the structure.



Metal fascia should be removed to reveal the wood fascia below.

#### **Treatment Rating 5: REMOVE/ALTER/REPLACE**

UNDERTAKE ALL NEW WORK AS SENSITIVELY AS POSSIBLE.

Statement of Importance:

- The metal fascia detracts from the historic appearance of the building, and
- the metal fascia supplies a mechanism for the deterioration of the wood siding beneath it, and
- the metal fascia does not contribute to the significance of the Black Officers' Club as a building from the World War II period.

Condition: ***Poor– Replace***

Fair to good - Replace

Poor - Replace

#### **Inventory Quantity and Condition**

The fascia is evaluated as Poor when:

- the fascia is intact, though becoming dismantled from the edge of the roof system in several areas, and
- detachment occurs in about 15% of the entire run, where the fascia is bent and the surface paint finish is scratched, and
- where the paint finish is cracked, corrosion of the fascia base metal is visible, and
- the metal fascia covers the original wood fascia below, and should be removed, requiring no repair.

**Serious deficiency of the metal fascia exists where:**

- The fascia is dismantled from the wood fascia beneath, and
- the fascia should be removed to reveal the intact wood fascia beneath, and
- the wood fascia underneath will need to be repaired and replaced where it is beyond repair, and
- the wood fascia will need to be cleaned, scraped, primed and repainted as laid out in the wood chapter of this manual, and
- there is deterioration which, if not corrected within 2-5 years, will result in the failure of the building element, and will lead to the failure of the surrounding elements, and
- there is deterioration of adjacent or related building materials and/or systems as a result of the element's deficiency.

Minor deficiencies can include, but are not limited to: corrosion where paint has delaminated, bent surface, and partially dismantled from construction assembly.

**4.6.1.2 Metal—Gutter**

NR Rating: 115

Description:

On the east elevation, a gutter has been installed just over the two north doors. This element is not historically relevant to the structure and should be removed.



The metal gutter is above the northeast entrance door.

**Treatment Rating 5: REMOVE/ALTER/REPLACE**

UNDERTAKE ALL NEW WORK AS SENSITIVELY AS POSSIBLE.

Statement of Importance:

- The metal gutter is not significant and through design or condition detracts from the historic appearance of the building.

Condition: *Fair – Replace*

Fair to good - Replace

Poor - Replace

### **Inventory Quantity and Condition**

The gutter is evaluated as Fair when:

- the only gutters on the buildings are four foot wide gutter segments over the two north entry doors, and
- these two gutters show no signs of deterioration, though they are not part of the original design, and
- though the gutters are intact, they are attached to the metal fascia which is to be removed, and
- an alternative water diverting device over the doorways should be investigated.

### **Minor deficiency of the gutter exists where:**

- There are no outward signs of deterioration, and
- the element provides no real benefit to the building. It does not substantially reduce or protect the user from rain or drainage from the roof, therefore should be removed, and
- the element, though does not detract from the appearance of the building, as it blends in, does not present any historic value therefore should be removed, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: rusting surfaces, wearing finishes, and

### **4.6.1.3 Metal—Hardware**

NR Rating: 113

Description:

Metal hardware includes operation handles for windows, door knobs, and locks for both window and doors. The hardware is not original but is a later sensitive repair. Care should be taken to maintain the historic appearance of the building.

### **Treatment Rating 3: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED WITH COMPATIBLE MATERIAL AND DESIGN.

Statement of Importance:

- The hardware has acquired significance in its own right or makes an important contribution to World War II period levels of significance identified for the property, and
- the hardware makes a significant contribution to the property's historic appearance and as an integral part of the building's historic construction.

Condition: *Good – Preserve*

Fair to good - Preserve

Poor - Replace

### **Inventory Quantity and Condition**

The hardware is evaluated as Good when:

- the hardware is intact, structurally sound and performing its intended purpose, and
- there are few or no cosmetic imperfections, and
- the hardware needs no repair and only minor or routine maintenance, and
- the hardware on the doors and windows is intact and operable, and
- the hardware shows signs of daily use and wear as the finishes are wearing, and
- the hardware needs to be maintained on a yearly basis in order to insure that it will continue to function properly.

### **Minor deficiency of the hardware exists where:**

- Clean rusty hinges, connectors, and door hardware, and
- replace hardware that is beyond surface cleaning, and
- maintain hardware so that it remains in correct working condition, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: rusting surfaces and wearing finishes.

#### **4.6.1.4 Metal—Louver**

NR Rating: 115

#### Description:

The louvers are located in the center of the west facade, just below the roofline, just above the entrance door, and centered on the facade. The louvers are rectangular in shape, constructed in wood and the frame is covered in metal sheeting.

#### **Treatment Rating 5: REMOVE/ALTER/REPLACE**

UNDERTAKE ALL NEW WORK AS SENSITIVELY AS POSSIBLE.

#### Statement of Importance:

- The metal louvers detract from the historic appearance of the building, and
- the metal louvers supply a mechanism for the deterioration of the wood siding beneath it, and
- the louvers do not contribute to the significance of the Black Officers' Club as a building from the World War II period.

Condition: ***Good– Replace***

Fair to good - Replace

Poor - Replace

### **Inventory Quantity and Condition**

The louvers are evaluated as Good when:

- the paint on the louver is peeling, and
- the current condition of the louver is a direct result of improper maintenance, and
- the louver should be removed to reveal the wood louver beneath, thus requiring no repair.

### **Minor deficiency of the metal louver cover exists where:**

- The painted metal covering the wood louver frame is peeling, and
- the metal frame should be removed to reveal the intact wood louvers beneath, and
- the wood louvers underneath will need to be repaired and replaced where it is beyond repair, and
- the wood louvers will need to be cleaned, scraped, primed and repainted as laid out in the wood chapter of this manual, and
- there is deterioration which, if not corrected within 2-5 years, will result in the failure of the building element, and will lead to the failure of the surrounding elements, and
- there is deterioration of adjacent or related building materials and/or systems as a result of the element's deficiency.

Minor deficiencies can include, but are not limited to: peeling paint.

### **4.6.1.5 Metal—Railing**

NR Rating: 116

Description:

Two metal railings are located on the north entrances and a third on the east entrance. They are attached to the concrete porches, and though they do not represent any historic value, they are a later sensitive repair and should be maintained for the safety of the user.

### **Treatment Rating 6: SPECIFIED TREATMENT IS NOT REQUIRED**

IF ANY WORK IS DONE ON THIS ELEMENT IT SHOULD BE SYMPATHETIC TO THE SIGNIFICANT QUALITIES OF THE HISTORIC PROPERTY.

Statement of Importance:

- The railing has no historic value and is attached to the concrete porch.

Condition: ***Fair– Repair***

Fair to good - Repair

Poor - Replace

## Inventory Quantity and Condition

The railings are evaluated as Fair when:

- the railings are intact and in use, though obviously not part of the original building, and
- the paint has delaminated in places, subjecting the railings to the effects of corrosion, and
- the corrosion is staining the concrete stoop because the protective paint layer on the railings has not being maintained, and
- the railings should be inspected, prepared and repainted yearly.

### **Minor deficiency of the metal railing exists where:**

- Rust staining is visible on surfaces below the railing, and
- the paint on the metal railing has delaminated in places, and
- parts of the railing are undergoing expansive corrosion, and
- the railing surface needs to be cleaned and completely repainted, and
- the railing should be inspected and repainted as needed after each winter, and
- care should be taken not to overlook the surface on the underside of the railing, and
- there is deterioration which, if not corrected within 2-5 years, will result in the failure of the building element, and will lead to the failure of the surrounding elements, and
- there is deterioration of adjacent or related building materials and/or systems as a result of the element's deficiency.

Minor deficiencies can include, but are not limited to: paint delamination and surface corrosion.

### **4.6.1.6 Metal—Ridge Cap**

NR Rating: 116

Description:

The ridge caps are located along the roof ridges of the main building and the south wing and serve to finish the roofing seam at the ridges. The ridge cap is not original to the building and therefore has no historic value. All repairs should be sympathetic to the original appearance of the building.

### **Treatment Rating 6: SPECIFIED TREATMENT IS NOT REQUIRED**

IF ANY WORK IS DONE ON THIS ELEMENT IT SHOULD BE SYMPATHETIC TO THE SIGNIFICANT QUALITIES OF THE HISTORIC PROPERTY.

Statement of Importance:

- The roof ridge cap is not original in the design of the Black Officers' Club and has no historic value.

Condition: *Fair– Repair*

Fair to good - Repair

Poor - Replace

## Inventory Quantity and Condition

The ridge cap is evaluated as Fair when:

- components of the ridge cap system are missing, and
- portions of the ridge cap are detached from the surface of the asphalt shingles, and
- the ridge cap should be repaired where it is failing to perform as it was designed and the missing components need to be replaced and installed.

### **Serious deficiency of the ridge cap exists where:**

- The ridge cap is missing in places, and
- the parts of the ridge cap that are missing should be replaced, and
- the replacement ridge cap should complement the existing cap, unless the cap is entirely replaced, and
- there is deterioration which, if not corrected within 2-5 years, will result in the failure of the building element, and
- there is deterioration of adjacent or related building materials and/or systems as a result of the element's deficiency.

Serious deficiencies can include, but are not limited to: missing elements.

## 4.6.1.7 Metal—Siding

NR Rating: 115

Description:

Painted metal siding covers the exterior walls of the Black Officers' Club. The siding detracts from the historic appearance of the structure and should be promptly removed to reveal the original wood siding underneath. The wood siding will then need to be repaired as per preservation standards.

### **Treatment Rating 5: REMOVE/ALTER/REPLACE**

UNDERTAKE ALL NEW WORK AS SENSITIVELY AS POSSIBLE.

Statement of Importance:

- The metal siding detracts from the historic appearance of the building, and
- supplies a mechanism for the deterioration of the wood siding beneath it, and
- does not contribute to the significance of the Black Officers' Club as a building from the World War II period.

Condition: ***Fair– Replace***

Fair to good - Replace

Poor - Replace

## Inventory Quantity and Condition

The siding is evaluated as Fair when:

- the metal siding is materially intact; however, it shows signs of corrosion and localized paint failure, and
- the current condition of the siding is due to improper maintenance, and

- the metal siding should be removed to reveal the wood clapboard siding beneath, thus the metal siding requires no repair.

**Minor deficiency of the siding exists where:**

- The siding is undergoing corrosion where paint has delaminated, and
- the siding should be removed to reveal the wood siding beneath, and
- the wood siding beneath should then be scraped, cleaned, primed and repainted as laid out in the wood chapter of this manual, and
- there is deterioration which, if not corrected within 2-5 years, will result in the failure of the building element, and will lead to the failure of the surrounding elements, and
- there is deterioration of adjacent or related building materials and/or systems as a result of the element's deficiency.

Minor deficiencies can include, but are not limited to: corrosion due to delamination of protective paint layer.

**4.6.1.8 Metal—Skirt**

NR Rating: 115

Description:

A dark brown painted metal skirt runs along the entire building perimeter. The metal skirt has louver vents to ventilate the crawlspace behind. The metal skirt is not original to the building and does not maintain the building’s historic appearance, therefore it should be removed to reveal the wood skirting below.

**Treatment Rating 5: REMOVE/ALTER/REPLACE**

UNDERTAKE ALL NEW WORK AS SENSITIVELY AS POSSIBLE.

Statement of Importance:

- The metal skirting detracts from the historic appearance of the building, and
- supplies a mechanism for the deterioration of the wood skirting beneath it, and
- does not contribute to the significance of the Black Officers’ Club as a building from the World War II period.

Condition: ***Fair- Replace***

Fair to good - Replace

Poor - Replace

**Inventory Quantity and Condition**

The skirt is evaluated as Fair when:

- the skirt shows signs of local corrosion which is hidden from afar, as the protective paint color is a dark brown, and
- the current condition of the skirt is as direct result of improper maintenance and construction, as in some places the skirt is directly in contact with the soil, and
- the metal skirt should be removed to reveal the wood skirting beneath, thus the metal skirt requires no repair.

### **Minor deficiency of the skirt exists where:**

- The skirting is undergoing corrosion where paint has delaminated from the surface, and
- the skirting is bent in places, and
- the skirting should be removed to reveal the wood skirting beneath, and
- the wood skirting beneath should then be scraped, cleaned, primed and repainted as laid out in the wood chapter of this manual, and
- there is deterioration which, if not corrected within 2-5 years, will result in the failure of the building element, and will lead to the failure of the surrounding elements, and
- there is deterioration of adjacent or related building materials and/or systems as a result of the element's deficiency.

Minor deficiencies can include, but are not limited to: bent surfaces and corrosion due to delamination of protective paint on surface.

## **4.6.2 Maintenance / Management Guidelines for Metal**

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic metal are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

### **4.6.2.1 Identify, Retain, and Preserve**

Recommended...

- Identifying, retaining, and preserving architectural metal features such as columns, capitals, window hoods, or stairways that are important in defining the overall historic character of the building; and their finishes and colors. Identification is also critical to differentiate between metals prior to work. Each metal has unique properties and thus requires different treatments.

Not Recommended...

- Removing or radically changing architectural metal features, which are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Removing a major portion of the historic architectural metal from a facade instead of repairing or replacing only the deteriorated metal, then reconstructing the facade with new material in order to create a uniform or "improved" appearance.
- Radically changing the type of finish or its historic color or accent scheme.

#### 4.6.2.2 Protect and Maintain

##### Recommended...

- Protecting and maintaining architectural metals from corrosion by providing proper drainage so that water does not stand on flat, horizontal surfaces or accumulate in curved, decorative features.
- Cleaning architectural metals, when appropriate, to remove corrosion prior to repainting or applying other appropriate protective coatings.
- Identifying the particular type of metal prior to any cleaning procedure and then testing to assure that the gentlest cleaning method possible is selected or determining that cleaning is inappropriate for the particular metal.
- Cleaning soft metals such as lead, tin, copper, terneplate, and zinc with appropriate chemical methods because their finishes can be easily abraded by blasting methods.
- Using the gentlest cleaning methods for cast iron, wrought iron, and steel--hard metals--in order to remove paint buildup and corrosion. If hand scraping and wire brushing have proven ineffective, low pressure grit blasting may be used as long as it does not abrade or damage the surface.
- Applying appropriate paint or other coating systems after cleaning in order to decrease the corrosion rate of metals or alloys.
- Repainting with colors that are appropriate to the historic building or district.
- Applying an appropriate protective coating, such as lacquer to an architectural metal feature subject to heavy pedestrian use, such as a bronze door.
- Evaluating the overall condition of the architectural metals to determine whether more than protection and maintenance are required, that is, if repairs to features will be necessary.

##### Not Recommended...

- Failing to identify, evaluate, and treat the causes of corrosion, such as moisture from leaking roofs or gutters.
- Placing incompatible metals together without providing a reliable separation material. Such incompatibility can result in galvanic corrosion of the less noble metal, e.g., copper will corrode cast iron, steel, tin, and aluminum.
- Exposing metals, which were intended to be protected from the environment.
- Applying paint or other coatings to metals such as copper, bronze, or stainless steel that were meant to be exposed.
- Removing the patina of historic metal. The patina may be a protective coating on some metals, such as bronze or copper, as well as a significant historic finish.
- Cleaning soft metals such as lead, tin, copper, terneplate, and zinc with grit blasting which will abrade the surface of the metal.
- Using cleaning methods, which alter or damage the historic color, texture, and finish of the metal, or cleaning when it is inappropriate for the metal.
- Failing to employ gentler methods prior to abrasively cleaning cast iron, wrought iron, or steel; or using high pressure grit blasting.

- Failing to re-apply protective coating systems to metals or alloys that require them after cleaning so that accelerated corrosion occurs.
- Using new colors that are inappropriate to the historic building or district.
- Failing to assess pedestrian use or new access patterns so that architectural metal features are subject to damage by use or inappropriate maintenance such as salting adjacent sidewalks.
- Failing to undertake adequate measures to assure the protection of architectural metal features.

#### **4.6.2.3 Repair**

Recommended...

- Repairing architectural metal features by patching, splicing, or otherwise reinforcing the metal following recognized preservation methods.
- Repairs may also include the limited replacement in-kind--or with a compatible substitute material--of those extensively deteriorated or missing parts of features when there are surviving prototypes such as porch balusters, column capitals or bases; or porch cresting.

Not Recommended...

- Replacing an entire architectural metal feature such as a column or a balustrade when repair of the metal and limited replacement of deteriorated or missing parts are appropriate.
- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the architectural metal feature or that is physically or chemically incompatible.

#### **4.6.2.4 Replace**

Recommended...

- Replacing in-kind an entire architectural metal feature that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence as a model to reproduce the feature.
- Examples could include cast iron porch steps or steel sash windows.
- If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

Not Recommended...

- Removing an architectural metal feature that is irreparable and not replacing it; or replacing it with a new architectural metal feature that does not convey the same visual appearance.

# PRIMERS AND PAINTS FOR WROUGHT IRON, CAST IRON, AND STEEL<sup>7</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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## 05010-13

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

This standard includes general information on primers and paints to be used on interior and exterior wrought iron, cast iron, and steel surfaces.

THE SELECTION OF A SUITABLE PRIMER AND PAINT FOR METALS DEPENDS ON MANY FACTORS INCLUDING THE TYPE OF METAL TO BE COATED, THE TYPE OF SURFACE PREPARATION TO BE USED, ENVIRONMENTAL AND SURFACE CONDITIONS, DESIRED APPEARANCE, AND PERFORMANCE REQUIREMENTS, METHOD OF APPLICATION, AND TYPE AND LEVEL OF EXPOSURE. CONSULT A PAINT MANUFACTURER ALONG WITH THE DIRECTORATE OF ENVIRONMENTAL COMPLIANCE AND MANAGEMENT BEFORE MAKING THE FINAL SELECTION.

The primary purpose of paint is to protect the metal from deterioration. To do so, paint manufacturers have developed paint systems, which are made to work together to protect the metal substrate. These systems include primers and appropriate, compatible topcoats, which can vary depending on the substrate, environmental conditions, and can, vary between manufacturers. As a result, appropriate primers and compatible topcoats, both from the same manufacturer should be used.

For information on paint removal from metal, surface preparation, and application procedures see the following:

For guidance on paint removal from iron and steel, see:

- 05010-05-R "Cleaning/Removing Paint From Wrought Iron, Cast Iron and Steel Using Mechanical/Abrasive Methods
- 05010-16-R "Removing Paint From Wrought Iron, Cast Iron and Steel Using Thermal Methods"
- 05010-17-R "Removing Paint From Wrought Iron, Cast Iron and Steel Using Chemical Methods"

For additional information on the history, properties and uses of paint, see 09900-01-S. See 09900-07-S for general guidelines on painting interior and exterior surfaces.

## PRIMERS FOR WROUGHT IRON, CAST IRON, AND STEEL

### Characteristics

- Primary function is adhesion.
- Must bond well to substrate and intermediate coat. Should have enough chemical and weather resistance to protect the substrate before application of next coat.

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<sup>7</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

- Should be compatible with intermediate and topcoats.
- Should be compatible with paint/rust removal methods.

## Types

### A. Oil/Alkyd Primers:

#### Advantages:

1. Bond well to most surfaces even if surface preparation is substandard; and
2. Compatible with oil finish coats.

#### Limitations:

1. NOT compatible with finish coats of vinyl, epoxy or other synthetic polymer. Solvents in these systems attack and soften these primers; and
2. Limited corrosion resistance

### B. Mixed Resin Primers:

#### Advantages:

1. Bond well to most surfaces, though adequate surface preparation is important; and
2. Compatible with most finish coats; and
3. Good alkali resistance; and
4. Some corrosion resistance.

#### Limitations:

1. It is only compatible with a specific range of topcoats.

### C. Resin Same as Topcoats:

#### Advantages:

1. Effective when surface is properly prepared; and
2. Some corrosion resistance.

### D. Inorganic Zinc:

#### Advantages:

1. Outstanding bonding characteristics when surface is cleaned and roughened; and
2. Compatible with most finish coats; and
3. Effectively resists disbanding; and
4. Excellent resistance to underfilm corrosion; and
5. Effective in protecting the metal without the help of a finish coat.

#### Limitations:

1. It is NOT acid or alkali-resistant.

### E. Wash Primers: Suitable for use on steel, aluminum, zinc, cadmium, chromium, tinplate, and terneplate.

#### Advantages:

1. Provides a smooth, durable, uniform base for finish coat application; and
2. Compatible with the following topcoats: vinyl, phenolics, alkyds, nitrocellulose, and oil-type products.

#### Limitations:

1. It is NOT recommended for surfaces subject to temperatures above 150 degrees F (66 degrees C).

### F. Conversion Coatings: Oxidizing solution Used on zinc, iron, aluminum, and magnesium (formulation will vary depending on type of metal). This type of coating is usually factory-applied.

#### Advantages:

1. Excellent corrosion resistance; and
2. Good adhesion to subsequent paint coats.

Limitations:

1. It is subject to deterioration if overheated.

G. Zinc Chromate: Used on aluminum, magnesium, and ferrous metals.

Advantages:

1. It has good corrosion resistance.

Limitations:

1. It is not suited to highly acidic environments.

H. Zinc-rich Coatings:

Advantages:

1. It has good corrosion resistance.

## **PAINTS FOR WROUGHT IRON, CAST IRON, AND STEEL**

### **Characteristics**

Should be compatible with primer

- Intermediate coat should uniformly bond the primer with the topcoat.
- Intermediate coat should have enough chemical and weather resistance to protect the primer and substrate.

### **Types**

A. Oil-based/Alkyd Enamel:

Advantages:

1. For normal to severe weather conditions, provides good abrasion and dirt resistance; and
2. Suitable for both exterior and interior uses; and
3. Good bonding characteristics.

Limitations:

1. Alkyds are not good in a continuously damp or chemically corrosive environment, nor are they solvent resistant; and
2. Limited alkali resistance.

B. Baked Phenolic:

Advantages:

1. Excellent resistance to acidic environments; and
2. Excellent resistance to water; and
3. Excellent resistance to strong solvents; and
4. Low material cost.

Limitations:

1. Low alkali resistance; and
2. High labor cost for application.

C. Epoxies:

Advantages:

1. Good adhesion, and
2. Good chemical resistance, and
3. Good abrasion resistance, and
4. Good alkali resistance.

Limitations:

1. Sensitive to chalking under exterior exposure, and
2. Sensitive to color fading, and
3. Weak in acid.

D. Acrylics: (thermoplastic and thermosetting coatings)

Advantages:

1. Moderate cost; and
2. Good resistance to degradation from ultraviolet light; and
3. Suitable for both interior and exterior use.

E. Vinyl: Used primarily as intermediate coats

Advantages:

1. Good alkali and acid resistance, and
2. Excellent water resistance, and
3. Low chalking rate.

Limitations

1. Limited solvent and heat resistance, and
2. Inferior to alkyd and epoxy coatings - lower adhesive strength, and
3. Sensitive to intercoat contamination.

F. Inorganic Zinc:

Advantages:

1. Excellent weather and solvent resistance, and
2. Excellent resistance to underfilm corrosion, and
3. Resistant to petroleum products.

Limitations:

1. Limited chemical resistance, and
2. Not suitable for strong acid or strong alkali environments.

G. Organic Zinc:

Advantages:

1. It protects against corrosion.

H. Furan:

Advantages:

1. It is one of the most versatile and resistant of organic films.

Limitations:

1. Poor adhesion to steel and any primed surface; and
2. The film gets very hard after curing, making it extremely difficult to maintain them.

I. Urethanes:

Advantages:

1. Excellent gloss and color retention; and
2. Preferable to epoxy protective coatings or primers; and
3. Available in a wide variety of formulations for different surface types and conditions.

Limitations:

1. Comparable to epoxies and vinyl in resistance to corrosion; and
2. Some tend to yellow when exposed to sunlight; and
3. It is expensive.

J. Silicones:

Advantages:

1. Excellent heat resistance; and
2. Excellent color and gloss retention; and
3. Available in pure or modified form (a mixture of 2 coating types).

Limitations:

1. It is expensive.

END OF SECTION

## 4.7 WOOD

### 4.7.1 Wood Element

#### 4.7.1.1 Wood—Fascia

NR Rating: 112

Description:

A painted wood fascia finishes the end of the rafters and is covered by a metal fascia. Once this metal fascia is removed, the wood fascia will need to be cleaned and repaired as per preservation standards.

#### **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The wood fascia contributes to the historic appearance of the Black Officers' Club, being an integral part of the historic appearance of the building, and
- the fascia contributes to the significance of the Black Officers' Club as a building from the World War II period.

Condition: *Good – Preserve*

Fair to good - Preserve

Poor - Replace

#### **Inventory Quantity and Condition**

The wood fascia is evaluated as Good when:

- the wood is intact, structurally sound and performing its intended purpose, and
- the wood should be cleaned, and
- the paint may need to be scraped and reapplied not neglecting the endgrain, and
- there are few or no cosmetic imperfections, and
- the wood balcony needs no repair and only minor or routine maintenance.

#### **Minor deficiency of the wood fascia exists where:**

- Any repairs to the wood should be made after cleaning the surface gently if necessary, and
- the wood should be cleaned and replaced if it is beyond surface cleaning, and
- the wood should be scraped, primed, and repainted, including the endgrain, which is most susceptible to water intake, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: paint deterioration.

#### 4.7.1.2 Wood—Fireplace

NR Rating: 112

Description:

Wood trim flanks the mantle and its structural support on the fireplace. The trim is finished with a stain and clear coat which are in reasonably good condition.

**Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The wood bead board contributes to the historic appearance of the Black Officers' Club, being an integral part of the historic appearance of the building, and
- the bead board contributes to the significance of the Black Officers' Club as a building from the World War II period.

Condition: *Good – Preserve*

Fair to good - Preserve

Poor - Replace

#### **Inventory Quantity and Condition**

The wood framing the fireplace mantle is evaluated as Good when:

- the wood is intact, structurally sound and performing its intended purpose, and
- the ornamental wood should be cleaned, and
- the paint may need to be scraped and reapplied not neglecting the endgrain, and
- there are few or no cosmetic imperfections, and
- repair should be executed by a professional in material restoration.

#### **Minor deficiency of the wood trim exists where:**

- The wood trim is intact but the surface finish is beading, and
- the beaded finish should be cleaned first, then repaired gently with a dab of turpentine on a soft cloth, and
- the beading should be gently smoothed by a professional wood restoration specialist, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: wear and deterioration of the surface finish.

### 4.7.1.3 Wood—Louver

NR Rating: 112

Description:

The wood louvers are centered in the center of the west facade, just below the roofline and just above the entrance door. The louver and its frame are rectangular in shape and constructed in wood. Currently, the frame is covered in metal sheeting.

#### **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The wood louvers contribute to the historic appearance of the Black Officers' Club, being an integral part of the historic appearance of the building, and
- the louvers contribute to the significance of the Black Officers' Club as a building from the World War II period.

Condition: *Good – Preserve*

Fair to good - Preserve

Poor - Replace

#### **Inventory Quantity and Condition**

The wood louvers are evaluated as Good when:

- the wood is intact, structurally sound and performing its intended purpose, and
- the ornamental wood should be cleaned, and
- the paint may need to be scraped and reapplied not neglecting the endgrain, and
- there are few or no cosmetic imperfections, and
- paint will need to be reapplied not neglecting the endgrain.

#### **Minor deficiency of the louver exists where:**

- The wood louver is covered with a painted metal louver, and
- the wood louver should be intact upon removal of the metal louver, and
- any repairs to the wood should be made after cleaning the surface gently if necessary, and
- the wood should be scraped, primed, and repainted, including the endgrain, which is most susceptible to water intake, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: paint deterioration.

#### 4.7.1.4 Wood—Siding

NR Rating: 112

Description:

The wood siding covers the exterior walls of all facades and is located beneath the painted metal siding. Overall, the siding appears to be in fair condition, though removal of the painted metal siding may reveal undetected damage. When not installed properly, the metal siding has a tendency to allow water to penetrate and remain promoting the excessive deterioration of the wood beneath. Though this is not always the case, there is the possibility.

**Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The wood siding contributes to the historic appearance of the Black Officers' Club, being an integral part of the historic appearance of the building, and
- contributes to the significance of the Black Officers' Club as a building from the World War II period.

Condition: *Good – Preserve*

Fair to good - Preserve

Poor - Replace

#### **Inventory Quantity and Condition**

The wood siding is evaluated as Good when:

- the wood is intact, structurally sound and performing its intended purpose, and
- the wood should be cleaned, and
- the paint may need to be scraped and reapplied not neglecting the endgrain, and
- there are few or no cosmetic imperfections, and
- paint will need to be reapplied not neglecting the endgrain.

#### **Minor deficiency of the siding exists where:**

- The wood siding is covered with a painted metal siding, and
- the wood siding should be intact upon removal of the metal, and
- any repairs to the wood should be made after cleaning the surface gently if necessary, and
- the wood should be scraped, primed, and repainted, including the endgrain, which is most susceptible to water intake, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: paint deterioration.

#### 4.7.1.5 Wood—Skirt

NR Rating: 112

Description:

The wood skirt runs along the entire building perimeter just below the metal skirting. Upon removal of the metal skirting the wood skirting should generally be in good condition. The skirting adds to the character of the building, and therefore should be repaired or replaced as needed and maintained regularly.

#### **Treatment Rating 2: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED IN-KIND.

Statement of Importance:

- The wood skirting contributes to the historic appearance of the Black Officers' Club, being an integral part of the historic appearance of the building, and
- the wood skirting contributes to the significance of the Black Officers' Club as a building from the World War II period.

Condition: *Good – Preserve*

Fair to good - Preserve

Poor - Replace

#### **Inventory Quantity and Condition**

The wood skirt is evaluated as Good when:

- the wood is intact, structurally sound and performing its intended purpose, and
- the wood should be cleaned, and
- the paint may need to be scraped and reapplied not neglecting the endgrain, and
- there are few or no cosmetic imperfections, and
- paint will need to be reapplied not neglecting the endgrain.

#### **Minor deficiency of the skirt exists where:**

- The wood skirt is covered with a painted metal skirt, and
- the wood skirt should be intact upon removal of the metal, and
- any repairs to the wood should be made after cleaning the surface gently if necessary, and
- the wood should be scraped, primed, and repainted, including the endgrain, which is most susceptible to water intake, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: paint deterioration.

## 4.7.2 Maintenance / Management Guidelines for Wood

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, replace them only when absolutely necessary.

The following recommendations for care of historic wood are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

### 4.7.2.1 Protect and Maintain

Recommended...

- Remove damaged or deteriorated paint only to the next sound layer using the gentlest means possible (hand scraper wire brush or sand paper), and then repaint. Stripping methods including hot air guns, heat plates, and chemical or dip stripping should be employed with great care, and only as a supplement to hand scraping, brushing and sanding.
- Apply specification-approved primer and paint following proper surface preparation and product instructions.
- Inspect regularly for wood that is excessively or continually moist and for evidence of insect infestation and fungal rot.

Not Recommended...

- Replacing, rebuilding, or altering any original wood features that could be preserved or consolidated.
- Introducing new or non-specific brands of paint, colors, or methods of application.
- Failing to identify, evaluate, and treat the causes of wood deterioration, including insect or fungus infestation.
- Using chemical preservatives (such as creosote), which can change the appearance of wood features.
- Using thermal devices improperly when removing paint so that historic woodwork is scorched or damaged.
- Address evidence of moisture infiltration and infestation as soon as possible.
- Use only hot-dipped, zinc-coated nails, bolts, and hardware for use on treated wood.
- Countersink and putty all new, exposed nails and screws according to general specifications. Failing to neutralize wood thoroughly after using chemicals so the new paint does not adhere.
- Allowing detachable wood features, like doors, to soak too long in a caustic solution so that the wood grain is raised and the surface roughened.

### **4.7.2.2 Repair**

Recommended...

- Fill moderate-sized holes and check cracks with putty or epoxy filler. Repair should be applied as per general specifications.
- Repair fragile original wood using well-tested consolidant when appropriate. Repairs should be physically, visually, and chemically compatible and identifiable upon close inspection.

Not Recommended...

- Removing or replacing original wood that could be stabilized and conserved, or repaired with limited replacement of deteriorated or missing parts.
- Using substitute materials that are physically, visually, or chemically incompatible with the original materials.

### **4.7.2.3 Replace**

Recommended...

- Replace deteriorated or damaged wood by carefully patching, piecing-in, or otherwise reinforcing the wood using recognized preservation methods. Replacement work should be permanently dated in an unobtrusive location.

Not Recommended...

- Removing an original wood feature that is repairable. Removing an original wood feature that is irreparable and not replacing it, or failing to label the new work.

# EXTERIOR PAINT PROBLEMS ON HISTORIC WOODWORK<sup>8</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures and  
The Rohm and Haas Paint Quality  
Institute Technical Procedures

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09910-01

PRESERVATION BRIEFS: 10

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

This standard includes the bulk of information contained in the original Preservation Brief developed by the National Park Service. To obtain a complete copy of this brief, including figures and illustrations, please contact:

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P.O. Box 371954  
Pittsburgh, PA 15250-7954

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A CAUTIONARY APPROACH TO PAINT REMOVAL IS INCLUDED IN THE GUIDELINES TO "THE SECRETARY OF THE INTERIOR STANDARDS FOR HISTORIC PRESERVATION PROJECTS." REMOVING PAINTS DOWN TO BARE WOOD SURFACES USING HARSH METHODS CAN PERMANENTLY DAMAGE THOSE SURFACES; THEREFORE SUCH METHODS ARE NOT RECOMMENDED. ALSO, TOTAL REMOVAL OBLITERATES EVIDENCE OF THE HISTORICAL PAINTS AND THEIR SEQUENCE AND ARCHITECTURAL CONTEXT.

## JUSTIFICATION FOR PAINT REMOVAL

Once conditions warranting removal have been identified, the general approach should be to remove paint to the next sound layer using the gentlest means possible, then to repaint. Practically speaking, paint can adhere just as effectively to existing paint as to bare wood, providing the previous coats of paint are also adhering uniformly and tightly to the wood and the surface is properly prepared for repainting (cleaned of dirt and chalk and dulled by sanding.) On the other hand, if painted exterior wood surfaces display continuous patterns of deep cracks or if they are extensively blistering and peeling so that bare wood is visible, then the old paint should be completely removed before repainting.

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<sup>8</sup> The following excerpts are from the U.S. General Services Administration (GSA) Technical Procedures and The Rohm Haas Paint Quality Institute Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf> and <http://www.paintquality.com>.

## I. CLASS I EXTERIOR SURFACE CONDITIONS GENERALLY REQUIRING NO PAINT REMOVAL:

### A. DIRT, SOOT, POLLUTION, COBWEBS, INSECT COCOONS, ETC.:

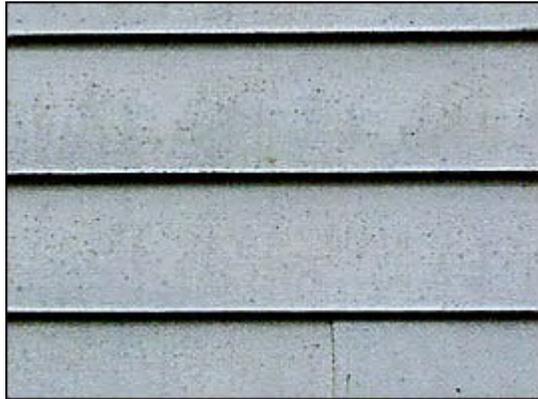
#### Cause of Condition:

Environmental "grime" or organic matter that tends to cling to painted exterior surfaces and, in particular, protected surfaces such as eaves, do not constitute a paint problem unless painted over rather than removed prior to repainting. If not removed, the surface deposits can be a barrier to proper adhesion and cause peeling.

#### Recommended Treatment:

Most surface matter can be loosened by a strong, direct stream of water from the nozzle of a garden hose. Stubborn dirt and soot will need to be scrubbed off using 1/2 cup of household detergent in a gallon of water with a medium soft bristle brush. The cleaned surface should then be rinsed thoroughly, and permitted to dry before further inspection to determine if repainting is necessary. Quite often, cleaning provides a satisfactory enough result to postpone repainting.

### B. MILDEW:



Black, gray, or brown areas of fungus growth on the surface of paint or caulk.

#### Cause of Condition:

Mildew is caused by fungi feeding on nutrients contained in the paint film or on dirt adhering to any surface. Because moisture is the single most important factor in its growth, mildew tends to thrive in areas where dampness and lack of sunshine are problems such as window sills, under eaves, around gutters and downspouts, on the north side of buildings, or in shaded areas near shrubbery. It may sometimes be difficult to distinguish mildew from dirt, but there is a simple test to differentiate: if a drop of household bleach is placed on the suspected surface, mildew will immediately turn white whereas dirt will continue to look like dirt. Specific causes of mildew include:

- Forms most often on areas that tend to be damp, and receive little or no direct sunlight (walls with a northerly exposure and the underside of eaves are particularly vulnerable); and
- The use of a lower quality paint, which may have an insufficient amount of mildewcide; and
- Failure to prime bare wood before painting; and
- Painting over a substrate or coating where mildew has not been removed.

**Recommended Treatment:**

Because mildew can only exist in shady, warm, moist areas, attention should be given to altering the environment that is conducive to fungal growth. The area in question may be shaded by trees which need to be pruned back to allow sunlight to strike the building; or may lack rain gutters or proper drainage at the base of the building. If the shady or moist conditions can be altered, the mildew is less likely to reappear. A recommended solution for removing mildew consists of one cup non-ammoniated detergent, one quart household bleach, and one gallon water. When the surface is scrubbed with this solution using a medium soft brush, the mildew should disappear; however, for particularly stubborn spots, an additional quart of bleach may be added. After the area is mildew-free, it should then be rinsed with a direct stream of water from the nozzle of a garden hose, and permitted to dry thoroughly. When repainting, use specially formulated exterior latex "mildew-resistant" primer and then a top-of-the-line exterior latex paint.

**C. STAINING:**



**Cause of Condition:**

Staining of paint coatings usually results from excess moisture reacting with materials within the wood substrate. There are two common types of staining, neither of which requires paint removal. The most prevalent type of stain is due to the oxidation or rusting of iron nails or metal (iron, steel, or copper) anchorage devices.

**Recommended Treatment:**

The source of the stain should first be located and the moisture problem corrected. When stains are caused by rusting of the heads of nails used to attach shingles or siding to an exterior wall or by rusting or oxidizing iron, steel, or copper anchorage devices adjacent to a painted surface, the metal objects themselves should be hand sanded and coated with a rust inhibitive primer followed by two finish coats. (Exposed nail heads should ideally be countersunk, spot primed, and the holes filled with a high quality wood filler except where exposure of the nail head was part of the original construction system or the wood is too fragile to withstand the countersinking procedure.)

Discoloration due to color extractives in replacement wood can usually be cleaned with a solution of equal parts denatured alcohol and water. After the affected area has been rinsed and permitted to dry, a "stain-blocking primer" especially developed for preventing this type of stain should be applied

(two primer coats are recommended for severe cases of bleeding prior to the finish coat).  
Each primer coat should be allowed to dry at least 48 hours.

## II. CLASS II EXTERIOR SURFACE CONDITIONS GENERALLY REQUIRING LIMITED PAINT REMOVAL:

### A. CRAZING:

#### Cause of Condition:

Crazing--fine, jagged interconnected breaks in the top layer of paint--results when paint that is several layers thick becomes excessively hard and brittle with age and is consequently no longer able to expand and contract with the

wood in response to changes in temperature and humidity. As the wood swells, the bond between paint layers is broken and hairline cracks appear. Although somewhat more difficult to detect as opposed to other more obvious paint problems, it is well worth the time to scrutinize all surfaces for crazing.

If not corrected, exterior moisture will enter the crazed surface, resulting in further swelling of the wood and, eventually, deep cracking and alligating, a Class III condition which requires total paint removal.

#### Recommended Treatment:

Crazing can be treated by hand or mechanically sanding the surface, then repainting. Although the hairline cracks may tend to show through the new paint, the surface will be protected against exterior moisture penetration.

### B. WRINKLING:



A rough, crinkled paint surface occurring when paint forms a "skin."

#### Cause of Condition:

Another error in application that can easily be avoided is wrinkling. This occurs when the top layer of paint dries before the layer underneath. The top layer of paint actually moves as the paint underneath (a primer, for example) is drying. Specific causes of wrinkling include:

- Paint applied too thickly (more likely when using alkyd or oil-based paints); and
- Painting a hot surface or in very hot weather (higher than recommended by the manufacturer); and
- Exposure of uncured paint to rain, dew, fog or high humidity levels; and
- Applying topcoat of paint to insufficiently dried first coat; and
- Painting over contaminated surface (e.g., dirt or wax).

#### Recommended Treatment:

The wrinkled layer can be removed by scraping, followed by hand or mechanical sanding to provide as even a surface as possible. Repaint, applying an even coat of top quality exterior

paint. Make sure the first coat or primer is dry before applying the topcoat. Apply paints at the manufacturer's recommended spread rate (two coats at the recommended spread rate are better than one thick coat). When painting during extremely hot, cool or damp weather, allow extra time for the paint to dry completely.

### III. CLASS III EXTERIOR SURFACE CONDITIONS GENERALLY REQUIRING TOTAL PAINT REMOVAL:

If surface conditions are such that the majority of paint will have to be removed prior to repainting, it is suggested that a small sample of intact paint be left in an inconspicuous area either by covering the area with a metal plate, or by marking the area and identifying it in some way. (When repainting does take place, the sample should not be painted over.) This will enable future investigators to have a record of the building's paint history.

#### A. PEELING:



Loss of paint due to poor adhesion or moisture. Where there is a primer and topcoat, or multiple coats of paint, peeling may involve some or all coats.

#### Cause of Condition:

Peeling to bare wood is most often caused by excess interior or exterior moisture that collects behind the paint film, thus impairing adhesion. Generally beginning as blisters, cracking and peeling occur as moisture causes the wood to swell, breaking the adhesion of the bottom layer. Common causes of peeling are:

- Seepage of moisture through uncaulked joints, worn caulk or leaks in roof or walls; and
- Excess moisture escaping through the exterior walls (more likely if paint is oil-based; and
- Inadequate surface preparation; and
- Use of lower quality paint; and
- Applying an oil-based paint over a wet surface; and
- Earlier blistering of paint (see Blistering).

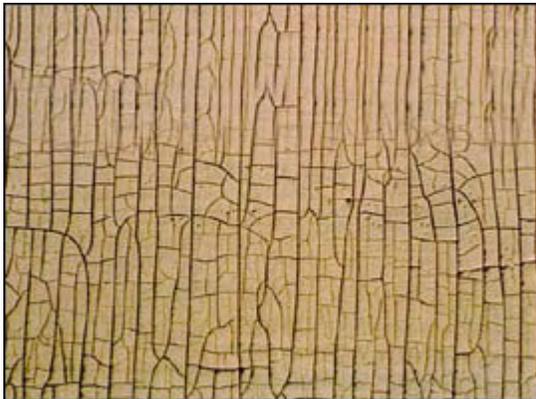
#### Recommended Treatment:

There is no reason for repainting before dealing with the moisture problems because new paint will simply fail. Therefore, the first step in treating peeling is to locate and remove the source or sources of the moisture, not only because moisture will jeopardize the protective coating of paint, but if left unattended, it can ultimately cause permanent damage to the wood. Exterior moisture should be eliminated by correcting the following conditions prior to repainting: faulty flashing; leaking gutters; defective roof shingles; cracks and holes in siding and trim; deteriorated caulking in joints and seams; and shrubbery growing too close to painted wood. After the moisture problems have been resolved, the wood must be permitted to dry out thoroughly. The damaged paint can then be scraped off with a scraper or stiff wire brush, sand rough edges, and apply appropriate primer. Repaint with a top quality acrylic latex exterior paint for best adhesion and water resistance.

## B. CRACKING / ALLIGATORING:



Cracking involves the splitting of a dry paint film through at least one coat, which will lead to complete failure of the paint. Early on, the problem appears as hairline cracks; later, flaking of paint chips occurs.



Alligatoring is the patterned cracking in the surface of the paint film resembling the regular scales of an alligator.

### Cause of Condition:

Cracking and alligatoring are advanced stages of crazing. Once the bond between layers has been broken due to intercoat paint failure, exterior moisture is able to penetrate the surface cracks, causing the wood to swell and deeper cracking to take place. This process continues until cracking, which forms parallel to grain, extends to bare wood. Ultimately, the cracking becomes an overall pattern of horizontal and vertical breaks in the paint layers that looks like reptile skin, hence, "alligatoring." In advanced stages of cracking and alligatoring, the surfaces will also flake badly. Specific causes of alligatoring and cracking include:

- Use of a lower quality paint that has inadequate adhesion and flexibility; and
- Over thinning the paint or spreading it too thin; and
- Poor surface preparation, especially when the paint is applied to bare wood without priming; and
- Painting under cool or windy conditions that make latex paint dry too fast; and
- Application of an extremely hard, rigid coating, like an alkyd enamel, over a more flexible coating, like a latex primer; and
- Application of a topcoat before the undercoat is dry; and
- Natural aging of oil-based paints as temperatures fluctuate. The constant expansion and contraction results in a loss of paint film elasticity.

### Recommended Treatment:

If cracking and alligatoring are present only in the top layers they can probably be scraped, hand or mechanically sanded to the next sound layer, then repainted. However, if cracking

and/or alligating have progressed to bare wood and the paint has begun to flake, it will need to be totally removed. Methods include scraping or paint removal with the electric heat plate, electric heat gun, or chemical strippers, depending on the particular area involved. Bare wood should be primed within 48 hours, then repainted.

It may be possible to correct cracking that does not go down to the substrate by removing the loose or flaking paint with a scraper or wire brush, sanding to feather the edges, priming any bare spots and repainting. If the cracking goes down to the substrate remove all of the paint by scraping, sanding and/or use of a heat gun; then prime and repaint with a quality exterior latex paint.

If the paint is alligating, old paint should be completely removed by scraping and sanding the surface; a heat gun can be used to speed work on large surfaces, but take care to avoid igniting paint or substrate. The surface should be primed with high quality latex or oil-based primer, and then painted with a top quality exterior latex paint.

# SURFACE PREPARATION FOR PAINT APPLICATION TO WOOD<sup>9</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures and  
The Rohm and Haas Paint Quality  
Institute Technical Procedures

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**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## **WARNING:**

**DO NOT ATTEMPT TO REMOVE PAINT IF YOU SUSPECT IT CONTAINS LEAD.**

This can cause an extreme health hazard. Lead paint was common until 1950, but was not outlawed in the U.S.A. until 1978. It should be generally assumed that because buildings built before 1950 involve one or more layers of lead-base paint, the majority of conditions warranting paint removal will mean dealing with this toxic substance along with the dangers of the paint removal tools and chemical strippers themselves. If you think you may have lead paint, contact the EPA hotline for information: **1-800-424-LEAD** or visit <http://www.epa.gov/opptintr/lead/leadinfo.htm>

If you suspect the presence of old paint containing lead, do not attempt to scrape, sand, power wash, use heat gun, etc., which might put lead into the environment, but rather contact a contractor qualified for lead assessment and abatement. Lead paint is most likely to be found in buildings that are more than 25 years old.

Sources of Lead Paint: Lead carbonate was used prior to World War II. A white powder, it was used as a primary white pigment in oil-based paints. During the 1940s and early '50s, "white lead" was replaced by titanium dioxide (TiO<sub>2</sub>), which is more efficient in providing whiteness and hiding. In the early 1970s, the use of lead compounds began to be phased out. In 1978, legislation eliminated them altogether. All interior and exterior house paints and primers are now made without lead. Some buildings, especially those built before this legislation was enacted, may contain lead paint. These paints present potential health hazards, especially for infants, small children, and pregnant women.

Paint performs better in mild conditions; in fact poor painting conditions can greatly compromise the paint job.

### 1. WEATHER CONDITIONS FOR GOOD ADHESION NOT TOO COLD, NOT TOO HOT

Most latex paints should be applied when the air temperature or the surface being painted is 35 - 50 °F – depending on the manufacturer's recommendation (see paint label). Painting in cold weather is more difficult, and it takes longer to dry, leaving the wet paint more susceptible to dirt, insects and pollen.

If you use a latex paint, wait until the temperature is predicted to remain above the recommended minimum for the next 36 hours.

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If you paint when it is too hot, the paint may not last as long. This is especially true with latex paints. Avoid painting in the following conditions, especially if more than one condition exists: air or surface temperature exceeds 90 degrees; direct sunshine (particularly dark colored paint); gusty winds; low humidity; highly porous surfaces such as old, weathered stucco. For latex paints, these conditions will adversely affect film formation of the latex binder and not provide you optimum properties.

## 2. SURFACE PREPARATION GUIDELINES

- Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items, or provide surface applied protection; and
- do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film; and
- remove all loose or poorly adhering paint by scraping, or by careful hand wire brushing using a stiff metal wire brush going with the grain of the wood; and
- wear eye protection, work gloves and a dust mask; and
- feather sand rough edges of remaining paint; and
- refresh surface of exposed, weathered wood by sanding with medium grit (#120) garnet paper; and
- treat any mildew; and
- remove dirt, chalk, dust, residual particles of paint, treated mildew by scrubbing with detergent and water, rinse thoroughly.

### A. GET RID OF MILDEW

Mildew is a spotty black, gray and brown mold that grows in warm, moist, low-light environments. Before you paint, look for mildew in areas that get little or no sun, like around the trim, under eaves, northern exposures and shaded areas.

**IMPORTANT:** Do not paint or stain over mildew. The paint or stain may cover it at first, but before long the mildew will grow right through the new coating.

### B. PREPARE GLOSSY SURFACES

Glossy areas should be dulled or paint/primer will not adhere well.

- Sand with a medium grit paper such as #100 - #120. Use fine grit paper such as #180 - #220 for critical work such as doors and prominent trim. Then remove any dust with a damp rag.
- Chemical deglossers are available, but require care and caution. Leaving a chemical deglosser on the surface too long can soften and wrinkle the old coating. If you use a chemical deglosser, make sure there is ample ventilation. Open windows, use fans, and follow manufacturer's instructions carefully. Exercise safety precautions – protective goggles, clothing, gloves, and respirator.

### C. CHECK ALL CAULKING

Caulk is used to seal areas where there are gaps in materials or where there were openings for pipes, wires, and light fixtures. Caulk keeps out the elements and insects and gives the building a finished look. Chances are, if it is time to repaint, it is also time to re-caulk.

- Check all the caulking and remove any that is old, cracked or pulled away from the surface; and
- Scrape the area and dust before priming if the area is to be painted, and
- Use acrylic or siliconized acrylic caulk for exterior use. For areas where building materials are not to be painted, use a clear acrylic caulk for cosmetic purposes. Silicone caulk is also good for exterior use, but should not be painted over, and
- Apply fresh caulk to all cracks and openings up to 1/2" wide, and
- Allow to dry overnight and re-apply as needed.

# REMOVAL PROCEDURES FOR OLD, DAMAGED PAINT OR STAIN<sup>10</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures and  
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A few different methods may need to be used to effectively remove deteriorated paint. Review the methods explained here to see which best suit the project. See procedure 06400-09-R "Removing Paint from Wood Features Using Thermal Methods", 06300-02-R "Procedures for Painting Wood Features", and 06400-07-R "Chemically Removing Paint from Wood Features" for additional guidance.

## A. SCRAPING

Scraping is most effective on flat surfaces, from smooth masonry and hardboard to wood and ferrous metal. Make sure the scraper is sharp and apply even pressure as you scrape in one direction; then scrape at 90 degrees. Shaped scrapers like triangles and ovals make it easier to get into corners and to scrape rounded profiles. Be sure NOT to apply pressure when scraping hardboard. For the really tough jobs, like hard or metal surfaces, try a two-hand scraper.

When the scraping is done, feather sand rough edges of remaining paint with a medium grit sandpaper such as #100 grit.

Wear goggles or face mask for eye protection. Wear leather or work gloves to protect the skin. Use a protective mask or respirator to limit dust intake.

## B. WIRE BRUSHING

Use a stiff metal hand brush on brick, stucco and other masonry and on wood shakes (in a vertical motion). Power wire brushing is for stubborn areas only and must be used with extreme care. Wear goggles or face mask for eye protection. Wear leather or work gloves to protect the skin. Use a protective mask or respirator to limit dust intake.

## C. SANDING

Areas that have been scraped should be smoothed with sanding. A power sanding tool like an electric belt sander is an option when the substrate is wood or steel. Do not attempt to power sand masonry, hardboard, aluminum or plastic materials.

## D. POWER WASHING

A high-pressure plain water stream held 6" to 8" from the surface will lift old, loose paint. NEVER use harsh cleansers or bleach. Always spray at a horizontal or downward angle. An upward angle can damage siding. Be careful around doors and windows since the spray may have enough force to shatter glass and damage seals. Do not use power washing on soft woods like cedar and redwood. Wear goggles and water-repellant clothing and footwear.

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## E. CHEMICAL REMOVAL

Strong solvent-based removers work well on most oil-based and latex paints, primers, stains, and varnishes. Chemical removers should be used only on small face-up areas such as trim and moldings. Make sure to select a chemical remover that is intended for your application. Use with extreme care and follow these directions:

- Before you begin, clear the area of children and pets and extinguish any fire sources; and
- Cover floors and steps and remove plants, rugs and furniture; and
- Apply a heavy coat to a small area (2–3 sq. ft) with a low-end natural bristle paint brush; and
- Allow plenty of time for it to work (see manufacturer's recommendations); and
- Carefully remove the softened coatings using a putty knife or wooden blade and scrape the materials into a cardboard carton; and
- Reapply more stripper if needed; and
- Clean the surface with wadded up paper towels. Do not use steel wool; it can discolor the surface; and
- Dispose of all refuse after the job, carefully following manufacturer's instructions.

**IMPORTANT:** Wear goggles or face mask and long sleeve shirt and long pants. Use chemical-resistant gloves and a respirator designed for use with chemical solvents. Follow all direction and safety precautions. Some products are highly flammable and all fire sources must be extinguished prior to use.

There are low odor solvent removers, but since they are not as strong, they may take much longer to work.

## F. HEAT GUN

A heat gun designed for paint removal – NOT a propane torch or blow torch – can be a good way remove old exterior paint and varnish. Follow these steps for a safe, effective job:

- Place a drop cloth under the entire work area; and
- Keep the drop cloth damp by spraying regularly with a garden hose; and
- Spray a light coating of water on the area where the paint is to be removed; and
- As the old coating bubbles and softens, carefully remove it with a putty knife and place it in a metal container for disposal; and

**IMPORTANT:** Wear goggles or face mask, long sleeve shirt, and long pants. Use chemical-resistant gloves and a respirator designed for use with a heat gun.

**IMPORTANT:** Do not remove old paint with a heat gun if you suspect it contains lead! The heat can vaporize the lead and cause a health hazard. Contact the EPA lead paint hotline at 1-800-424-LEAD.

# PRIMERS AND PAINTS FOR WOOD<sup>11</sup>

U.S. General Services Administration  
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## PRIMERS AND PAINTS FOR WOOD

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

This standard includes general information on primers and paints to be used on exterior wood surfaces. The primary purpose of paint is to protect wood from deterioration. To do so, paint manufacturers have developed paint systems which are made to work together to protect the wood substrate. These systems include primers and appropriate, compatible topcoats which can vary depending on the substrate and can vary between manufacturers. As a result appropriate primers and compatible topcoats, both from the same manufacturer should be used.

### CHARACTERISTICS OF PRIMERS

Primers prevent certain chemical reactions from occurring between the wood and the topcoats. In wood, water soluble extractives are often a natural constituent of many wood species. Stain blocking primers, either oil- or water-based are especially important to use in these situations. They provide a more stable substrate for the new topcoats. They provide a uniform coat allowing more even color coverage of the topcoats. They bind weathered wood fibers, providing a more stable substrate. For areas subject to heavy mildew, mildew resistant primers are also available, making the surface less susceptible to mildew.

#### Types:

##### 1. Oil / Alkyd Primers:

- Must be applied to a completely dry surface; and
- Recommended for use when all of the paint has NOT been removed from the surface. Oil based paint is better able to bind with old, chalky paint layers thereby providing a more stable base for the finish coats; and
- Recommended for use if the existing paint type is unknown (oil or latex?), or if a switch to latex topcoat is being made; and
- Appropriate for use on wood surfaces from which all paint has been removed but which are subject to less movement, i.e. a wall surface rather than a fence.

#### Advantages:

Oil / Alkyd primers have excellent stain blocking capabilities, and are suited for wood in which the paint has NOT been removed.

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## 2. Acrylic Latex Primers:

- Found to be successful when used on wood surfaces from which all of the paint has been removed and from wood surfaces which are "fresh"; and
- They are especially good for surfaces which are considered difficult situations i.e. free-standing elements such as fences, columns, balustrades, etc. where wood is constantly moving; and
- They can be applied to wood that is slightly damp.

### Advantages:

Acrylic latex primers are more flexible than oil/alkyd paints.

### Limitations:

As latex paint dries it shrinks more than oil and can literally pull off older, more brittle paint layers as it dries. Therefore, oil/alkyd paints are usually recommended for use on wood surfaces where all of the paint has not been removed.

### Products:

1. Lucite brand of Forest Products Lab: Found to be the most flexible and is the only acrylic latex primer which has a good stain blocker.
2. If Lucite is unavailable and the wood being painted contains water soluble extractives (cedar and redwood), then an oil/alkyd primer is recommended.
3. If in doubt about the stain-blocking capabilities of a selected latex primer, test it.

## CHARACTERISTICS OF PAINTS

Made up of three basic ingredients:

1. A binder - oil or water
2. Thinner - mineral spirits, turpentine or water
3. Pigment - organic or inorganic

To these basic ingredients can be added any number of additives to produce specialized paints. The term vehicle, often used in reference to paint, refers to the binder plus the thinner. Binder is key to paint formulation. The type and amount of binder affect everything from stain resistance and gloss, to adhesion and crack resistance.

Latex paints use several polymer types as binders, including 100 percent acrylic, styrene-acrylic, and vinyl acrylic ("PVA" for polyvinyl acetate). Whereas, oil paints use a binder based on a drying oil such as linseed or Soya, or some other type of modified oil (in which case these paints are called alkyds).

In general, latex paints have better exterior durability than do oil-based or alkyd paints. They have better color retention, chalk resistance and resistance to longer-term embrittlement and cracking.

Higher quality latex paints have greater durability and other performance advantages over lower quality latex paints mostly due to the type and amount of acrylic binder used.

Quality paints with 100 percent acrylic binders are especially durable. They adhere to many different surfaces (wood, masonry, aluminum siding, and vinyl siding), and are more durable than latex paints (with vinyl binders) on fresh masonry surfaces. Other paints will show early color loss and film deterioration while 100 percent acrylic latex paints are resistant to the effects of alkaline surfaces.

Pigments are finely ground particles or powders which are dispersed in a paint. "Prime" pigments provide color and opacity. The most common prime pigment is titanium dioxide, which is white. It is

used in latex and oil-based paints. "Extender" pigments provide bulk to the paint at a low cost. These pigments impact on properties like scrub resistance, stain resistance and chalk resistance.

**IMPORTANT:** Higher quality paints will have higher levels of prime pigment than lower quality paints. Also, better quality paints have less extender pigment in relation to binder level. This makes them more chalk resistant on exterior exposure, providing better color retention and durability. Though all paints will eventually fade, the rate of fading will be much lower with better quality paints.

Additives are performance-enhancing ingredients that are typically added to top quality paints more than to ordinary paints. They provide desirable properties such as ease of application and the appearance of the applied paint. Some also have protective qualities, such as mildewcides.

Mildewcides are a category of additives used in exterior paints to keep mildew in check so that the paint looks fresh. These ingredients are expensive, hence, higher levels are found in higher quality paints. Other additives include Dispersing agents (to help the pigment remain evenly distributed); and preservatives (to prevent spoilage of paint during storage).

Types of Paints:

NOTE: The paint selected must be from the same manufacturer and made to be used with the primer selected. It should also be selected for use in a specific situation where applicable, such as using porch and deck enamel when painting porch floors.

**CAUTION:** PAINTS CONTAINING ZINC ARE TO BE AVOIDED WHEN PAINTING WOOD, AS ZINC ATTRACTS MOISTURE.

1. Oil / Alkyd Paints:

- These are opaque coatings which use natural oils, such as linseed oil, or modern alkyds as the binder; and
- Alkyds are oil modified resins which dry faster and harder than ordinary oils; and
- They offer the best protection from both liquid and vaporous water but become brittle with age and eventually are unable to move with the substrate and peel, crack, flake, etc.

Limitations:

Limitations to using oil / alkyd primers are their longer drying time; they are more difficult to clean up than latex paints; and they can be odorous, volatile and flammable due to the presence of organic solvents.

2. Emulsion or Latex Paints:

- Also known as water based paints, these paints have a latex binder which has been emulsified or suspended in water; and
- Acrylic latex resins are particularly durable and favored over polyvinyl acetate and polyvinyl chloride latex resins; and
- They allow more water vapor to pass through than oil based paints and they are more flexible, even over time. Nevertheless, they will eventually peel, flake, or crack; and
- For optimal results when using acrylic latex paints, make sure that for at least the first 24 hours after application, a temperature of 50°F can be maintained.

**Advantages:**

General advantages to using latex paints are they are easy to clean-up; they may be thinned with water; they are more flexible than oil / alkyd paints; and they provide better resistance to mildew because there is no oil in the paint. The oil of oil/alkyd paints acts as food for mildew. They also have decreased odor, toxicity, and flammability (due to lack of organic solvents and thinners.)

**NOTE: THERE HAVE BEEN CASES WHERE MILDEW HAS PROLIFERATED EVEN ON A LATEX PAINT SURFACE; APPARENTLY THE TINT USED TO COLOR THE PAINT PROVIDED THE NECESSARY FOOD SOURCE.**

- a. Acrylic-based paints:
  - Excellent color and gloss retention
  - Good flexibility and durability
  
- b. Polyvinyl acetate emulsion paints:
  - Low cost
  - Excellent color retention
  
- c. Linseed-oil resin-emulsion systems:
  - Easy to make
  - Low material cost
  - Improves paint durability

**Limitations:**

General limitations for the use of emulsion paints are that some require the use of a special primer or sealer to seal chalky surfaces and prevent peeling of the new coating.

- a. Acrylic-based paints:
  - Sometimes have poor color retention in dark tints.
  - Sometimes combined with alkyd-resins for better adhesion; This increases the potential of mildew growth.
  
- b. Polyvinyl acetate emulsion paints: sentence
  - Moderate durability when used alone; Durability is increased when the vinyl acetate emulsion is blended with other emulsions (i.e. acrylic, Linseed oil, alkyd-resin).
  
- c. Styrene-butadiene paints:
  - Normally not used on exterior.
  - Tend to yellow with age.
  - Not very flexible - grain cracking is a frequent problem when applied to wood.
  - Not readily available today.

**Products/Suppliers:**

1. Benjamin Moore and Co.
2. Glidden
3. PPG Industries, Pittsburgh Paints
4. Pratt and Lambert
5. The Sherwin-Williams Company

NOTE: There are some paints on the market known as self-cleaning paints. As rainwater runs down the wall the paint is slowly worn away. This is called chalking. Such paints should NOT be used if there is an unpainted surface or contrasting color below the painted surface, such as a red brick foundation wall. The streaking can be unsightly.

### SELECTING PRIMERS

As with paints, there are two broad classifications of primers and sealers: latex and water-based products, and alkyd or oil-based products. Both types come in interior and exterior formulations. There are also shellac based primers that have alcohol as their thinner. In most cases, quality latex primers and sealers perform as well as oil-based products, if not better. However, on severely staining wood and on heavily chalked surfaces, oil-based primers do provide better stain blocking and adhesion.

1. Guidelines for Exterior Applications:
  - a. New Unpainted Wood:

If the wood is not severely staining, either quality acrylic latex or an oil-based exterior wood primer is recommended. In the case of severely staining woods, an oil-based stain-blocking primer is best. New wood should be primed within two weeks to keep wood fibers from deteriorating and reducing adhesion.
  - b. Weathered and Unpainted Wood:

Either a quality latex or oil-based primer is recommended. Scrape and sand the wood thoroughly before priming because the deteriorated wood fibers must be removed, or adhesion will be compromised. Also, the primer should be applied shortly after surface preparation.
  - c. Previously Painted Wood:

All loose paint should be scraped off and rough edges feather-sanded. Any bare spots should be sanded thoroughly and dusted off. In addition, as much chalk as possible should be removed before priming. If the old paint is very chalky, and all the chalk cannot be removed, the use of an oil-based primer is recommended. If the old paint is in sound condition and is still adhering well, priming can be beneficial, but is not necessary.
  - d. Stucco and Masonry:

On new masonry, or older surfaces that are very porous, a latex masonry sealer or primer is recommended. In a repaint situation, use a sealer only where the old paint has been removed during surface preparation or through weathering.
  - e. Aluminum or Galvanized Iron:

Remove any white, powdery oxide, using a non-metallic scouring pad or steel wool (be sure all steel particles are washed off). Then apply a corrosion-inhibitive metal primer to all exposed bare metal
  - f. Ferrous Metals:

Remove any rust by wire brushing. Rinse, let dry and then apply a latex or oil-based rust-inhibitive primer. Two coats of primer will provide added protection against future rusting.
2. Primer Selection According to Surface Application:
  - a. New Wood:

Prime with a quality acrylic latex or oil-based wood primer. Be sure the primer is stain-blocking when staining woods such as cedar or redwood; oil-based primers are better for severely staining woods.

- b. Repaint:  
Primer usually not necessary unless paint is glossy or very chalky, or bare substrate is exposed. Still, priming the entire surface will maximize adhesion and uniformity of appearance.
- c. Weathered Wood:  
Thoroughly sand weathered or exposed wood, removing all gray fibers; dust off. Apply a wood primer before painting.
- d. Masonry:  
Apply sealer or latex masonry or general purpose primer if surface is fresh or very porous. In repaint situation, use primer if old paint is porous, stained, or has been removed by scraping or wire brushing. Ferrous Metals:  
If rusted, remove as much rust as possible, clean and rinse, and apply acrylic latex or oil-based corrosion-inhibitive primer (two coats are better) before top coating.
- e. Aluminum, Galvanized Steel:  
Clean the surface. Remove any powdery oxide with non-metallic scouring pad. Apply acrylic latex rust-inhibitive primer, then topcoat. If previously painted, priming not necessary if sound and rust-free.

**IMPORTANT:** Make sure to choose a primer that is specially formulated for the surface to be painted (wood, masonry, hardboard, metal substrates). Be sure to use an exterior primer for exterior work.

**IMPORTANT:** Be sure to read and follow all manufacturers' recommendations.

#### SELECTING PAINT

When doing exterior painting, one of the most important decisions is the quality of paint to be used. According to the Paint Quality Institute, a leading authority on paint performance, TOP QUALITY paints are designed to produce the best-looking and longest-lasting results. And even though quality paints may cost a little more, they can last more than twice as long as ordinary paints — so they are really more economical in the long run. Some of the specific benefits of using top quality paints, compared with using “economy” paint are:

- Superior adhesion, less likely to blister, flake or peel; and
- Better chalk resistance, for excellent color retention; and
- Better dirt resistance, so the paint remains fresh-looking; and
- Better mildew resistance, so paint will not be marred by black or brown blotches; and
- Overall superior durability.

#### GUIDELINES:

- Use top-of-the-line exterior 100% acrylic latex house paint (see definition below), and
- A flat finish will provide a more uniform appearance; quality satin and semi-gloss finishes will resist mildew more than a flat.

**DO NOT** apply oil-based paint over latex paint.

**IMPORTANT:** A can of quality paint will contain a higher volume of solid material (pigment and binder) than do ordinary paints. In the case of top quality latex paints, that means more solids and less water. Therefore, if a top quality paint and an ordinary paint were to be applied at the same spread rate, the top quality paint would dry to a thicker paint film due to its higher solids content. A top quality paint will contain 35 to 45 percent volume solids, while an ordinary paint will contain about 25 to 30 percent.

# EPOXY REPAIR FOR DETERIORATION AND DECAY IN WOODEN MEMBERS<sup>12</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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## 06300-01

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### PART 1---GENERAL

#### 1.01 SUMMARY

This procedure includes guidance on stabilizing decayed wood members with epoxy consolidant and filler.

- A. Deterioration and decay in wood results from moisture infiltration, accompanying fungal growth and insect infestation. Paint, caulk, and sealant failures are also a major cause of wood deterioration.
- B. Some sources of moisture may include the original moisture in green wood, rainwater, condensation, ground water, piped water, and water released by water-conducting fungus through the process of decay itself.
- C. Epoxy repair may be appropriate if:
  - 1. the piece to be repaired is historically significant. Epoxy repair makes it possible to retain most of an original component by selectively repairing only the damaged area.
  - 2. if the piece is decorative and replacement would be too expensive or impossible.
- D. Epoxy repair may NOT be appropriate if:
  - 1. the piece is a structural member. Epoxy has adequate compression strength, but is not the best choice to repair a member in tension. In this case, replacement is usually a better option.
  - 2. the wood to be repaired is to remain unpainted, as the epoxy is quite different in appearance from wood. In this case, the wood should be selectively replaced.
  - 3. if the area to be repaired is large, as epoxy repair can be expensive.
- E. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

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<sup>12</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hftp.nsf>

## **PART 2---PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Conservation Services  
8 Lakeside Trail  
Kinnelon, NJ 07405  
201/838-6412
  
- B. Abatron, Inc.  
5501 95th Ave.  
Kenosha, WI 53144  
800/445-1754 or 414/653-2000
  
- C. Roux Laboratories  
5344 Overmyer Dr.  
Jacksonville, FL 32205  
904/693-1200

### **2.02 MATERIALS**

- A. Epoxy consolidant and epoxy filler, both are multiple part compounds. Purchase by the gallon unless a large amount of epoxying needs to be done. Use one of the following, or approved equal:
  - 1. "Con Serv (T) Flexible Consolidant 100" (Conservation Services): Cures slowly with a 5 to 7 hour application time to allow deep penetration. Complete hardness is achieved in 3 to 6 days.
  - 2. "Con Serv (T) Flexible Patch 200" (Conservation Services): A four part putty-like filler; Is not easy to mix in small amounts; Consistency and hardness are easily controlled with this material.

NOTE: The products of Conservation Services are recommended for treatment of thicker wood such as windowsills. Because of its slower curing time, it allows for deeper penetration into members.

- 3. "Liquidwood-1" Consolidant (Abatron): Solidifies in a short period.
- 4. "Woodepox-2" Adhesive Paste (Abatron): A two-part paste mix; final hardness is determined by varying the ratio of the two parts. The LiquidWood can be used as a thinner, but this reduces the flexibility of the filler.

NOTE: These Abatron products are recommended for use on smaller members such as window sashes where deep penetration of consolidant is not required. The quick drying feature is an advantage for small, but repetitive, jobs. Abatron carries twenty different types of wood consolidant with varying degrees of penetration.

- B. Oil clay that can be purchased from a hobby store – used to keep consolidant from leaking through cracks.
  
- C. Nitril Rubber Gloves (Abatron)
  
- D. Disposable vinyl gloves: Available from drug store or pharmaceutical supply distributor in 50 count or larger boxes.

### **2.03 EQUIPMENT**

- A. Plastic bottles, like those used for hair dye, to apply the consolidant; having many on hand is recommended. Cleaning of the bottles for reuse is possible.

- B. Applicator bottles: Available from drug store and sold for hair dye application usually in 8 fl. oz. size; Also available in bulk from Roux Laboratories. Roux Color Applicators lend themselves more easily to cleaning and reuse.
- C. Rags of different sizes to wipe up spills before epoxy has a chance to harden, small rags are recommended for quick one-time uses such as wiping off spouts and caps.
- D. Thin wooden sticks, approximately 8" long for scooping out paste and mixing consolidant.
- E. Goggles and a respirator for protection from fumes
- F. Putty knives for application of filler
- G. Channel lock pliers for opening stuck caps
- H. Allen wrench to clean out cap holes
- I. Needle nose pliers to pull out hardened epoxy
- J. 1/8"x8"x12" Masonite boards for mixing paste filler
- K. Carbon dioxide fire extinguisher: Curing epoxy creates heat that may cause fire.
- L. Rotary saw
- M. Air compressor
- N. Drill
- O. Stiff bristle brushes

### **PART 3---EXECUTION**

#### **3.01 EXAMINATION**

- A. Detect rot using the "Pick Test":
  - 1. Insert an ice pick into the wood at a slight angle.
  - 2. Lift the pick out. If the wood splinters in long pieces, the wood is ok. If the wood snaps where the pick is being lifted, the wood is decayed.
- B. When rot is discovered:
  - 1. Determine the source of moisture infiltration and eliminate it.
    - a. If rot is only present on the surface, drying is all that is necessary to stop the spread of decay and kill off any growth.
  - 2. If source of moisture is unknown, treat the wood with a preservative.
    - a. Preservatives are caustic chemicals and should be handled with care.
    - b. A particularly dangerous wood preserving chemical is pentachlorophenol (a.k.a. penta).

**CAUTION: THIS CHEMICAL IS CARCINOGENIC AND ITS USE IS BANNED IN MANY STATES.**

- 3. Preservatives will eliminate fungal growth, but generally do not restore strength to the deteriorated wood material.

### 3.02 PREPARATION

#### A. Surface Preparation:

1. Dry affected wood member completely to arrest further decay. Dry in place if possible -or- remove the member and keep in a cool dry place until dry.

CAUTION: IF THIS PRECAUTION IS NOT TAKEN, THE EPOXY CAN ACTUALLY TRAP MOISTURE IN WOOD FIBERS AND ACCELERATE THE DECAY PROCESS.

2. Have all materials at hand before the mixing process begins.
3. Label all caps and lids so that a cap or lid is not placed on the wrong container or it may remain there permanently.

### 3.03 ERECTION, INSTALLATION, APPLICATION

CAUTION: AS EPOXIES CURE, HEAT IS PRODUCED. FOR THIS REASON, EPOXIES SHOULD BE USED IN SMALL QUANTITIES TO DETER EXTENSIVE HEAT BUILD-UP. CARE SHOULD BE TAKEN WHEN USING EPOXY ON A HOT DAY.

#### A. Repair decayed wood using epoxy wood consolidant:

1. Drill 1/4" or 3/16" holes in affected wood to receive epoxy consolidant:
  - a. Drill holes at an angle and spaced approximately 2" on center in staggered rows. The top of one hole should line up with the bottom of the next hole.

CAUTION: BE SURE NOT TO DRILL THROUGH THE ENTIRE SURFACE FOR CONSOLIDANT WILL LEAK OUT FROM BEHIND.

- b. Dam any surface cracks with oil clay so that epoxy will not leak.
2. Remove sawdust and dirt from drilled holes using compressed air or stiff bristle brushes.
3. Following manufacturer's instructions, mix a small amount of the consolidant components (resin and hardener) together in an applicator bottle. Stir the mixture thoroughly by hand with a thin stick for 4 minutes or with a bent coat hanger chucked into a drill for 2 minutes.
4. Using a large plastic syringe or squeeze bottle and tube spout, carefully squirt the consolidant into the pre-drilled holes. Completely saturate the wood, moving from hole to hole refilling until the wood can hold no more. More than one application may be needed.
5. Wipe off any excess consolidant or spills and cover the treated area to protect until cured as directed by epoxy manufacturer.
6. If severed pieces need to be re-attached, glue them in place with a mixture of consolidant and filler.

#### B. When the consolidant has cured, fill the voids in the surface with epoxy filler (wood-epoxy putty):

1. Mix the two part epoxy filler following the same procedures for mixing consolidant in Section 3.03 A.3. above. Mix filler to achieve the consistency of a glazing compound that can be worked with a putty knife.
2. Apply the filler to the surface:
  - a. For large voids, apply filler in 1" thick layers. This reduces the possibility of problems associated with heat build-up.
  - b. Build up filler layers slightly above the wood surface to allow for planing and sanding smooth after it has cured.
3. When the filler has cured, sand or plane the surface smooth.
4. Apply a wood preservative to surrounding wood surfaces and prime and paint the entire surface.

END OF SECTION

# BIENNIAL CLEANING AND STAIN REMOVAL OF WOODWORK<sup>13</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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## 06400-02

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### PART 1---GENERAL

#### 1.01 SUMMARY

- A. This procedure includes guidance on the routine dusting and cleaning of wood surfaces.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Quality Assurance
  - 4. Delivery, Storage, and Handling
  - 5. Project/Site Conditions
  - 6. Sequencing and Scheduling
  - 7. General Protection (Surface and Surrounding)

#### 1.02 SUBMITTALS

- A. Samples:  
**Submit sample of stain and wood filler for approval by the Cultural Resources POC.**

### PART 2---PRODUCTS

#### 2.01 MANUFACTURERS

- A. Butcher Polish Company  
120 Bartlett Street  
Marlborough, MA  
617/481-5700

#### 2.02 MATERIALS

NOTE: Chemical products are sometimes sold under a common name. This usually means that the substance is not as pure as the same chemical sold under its chemical name. The grade of purity of common name substances, however, is usually adequate for stain removal work, and these products should be purchased when available, as they tend to be less expensive. Common names are indicated below by an asterisk (\*).

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<sup>13</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

- A. Solvent: Mineral spirits, turpentine, or denatured alcohol.

Mineral Spirits:

A petroleum distillate that is used especially as a paint or varnish thinner.

1. Other chemical or common names include Benzine\* (not Benzene); Naphtha\*; Petroleum spirits\*; Solvent naphtha\*.
2. Potential Hazards: TOXIC AND FLAMMABLE.
3. Safety Precautions:
  - a. AVOID REPEATED OR PROLONGED SKIN CONTACT.
  - b. ALWAYS wear rubber gloves when handling mineral spirits.
  - c. If any chemical is splashed onto the skin, wash immediately with soap and water.
  - d. Available from construction specialties distributor, hardware store, paint store, or printer's supply distributor.

Turpentine:

1. Typically used as a solvent and thinner.
2. Potential Hazards: TOXIC AND FLAMMABLE.
3. Safety Precautions:
  - a. Work in a well ventilated area.
  - b. Observe safety rules as turpentine is flammable, and the fumes can trip an ionization smoke detection system.
  - c. Store soiled cloths in a metal safety container to guard against spontaneous combustion.
  - d. Available from hardware store or paint store.

Denatured Alcohol:

1. Other chemical or common names include Methylated spirit\*.
2. Potential hazards: TOXIC AND FLAMMABLE.
3. Available from hardware store, paint store, or printer's supply distributor.
4. Denatured alcohol should be a satisfactory substitute for ethyl alcohol for stain removing purposes.

- B. Cloth: Clean cotton rags

- C. Sand paper: 3 grades, finest grade 00

- D. Wax: Butcher's wax, such as "Butcher's paste Wax (Butcher Polish Company)

- E. Bleach: Standard household bleach

1. An unstable salt produced usually in aqueous solution and used as a bleaching and disinfecting agent.
2. Other chemical or common names include Bleaching solution\*; Household bleach\*; Laundry bleach\*; Sodium Hypochlorite; Solution of chlorinated soda\*.
3. Potential Hazards: CORROSIVE TO FLESH.
4. Available from chemical supply house, grocery store or supermarket, hardware store or janitorial supply distributor.

- F. Oil Stain and Thinner: To achieve a match between stained areas and original wood finish.

- G. Shellac burn-in sticks

- H. Clean, potable water

## **PART 3---EXECUTION**

### **3.01 ERECTION, INSTALLATION, APPLICATION**

- A. Dust with a solvent-treated soft cloth.
- B. Dry rub with a soft cloth to maintain the polish, rubbing along the grain of the wood.
- C. Stain and Spot Removal: Stains may be cleaned by promptly wiping with cloth dampened in clear water or rubbing with cloth dampened in solvent. Dry the wood with a soft cloth. White spots may be removed by rubbing them with a small amount of linseed oil.
- D. Old Stain Removal: If water and solvent fail to remove dark stains, brush full-strength bleach onto stained area and allow to stand one minute. Use clean, cotton rags to keep the bleach from running.

#### **TEST BLEACH IN A SMALL INCONSPICUOUS AREA PRIOR TO USING THE BLEACH ON THE LARGE STAIN TO ENSURE THAT IT WILL NOT DAMAGE THE WOOD.**

- 1. Rinse bleach completely from wood.
  - 2. If area is too light in color, carefully apply a small amount of stain to match original wood finish.
  - 3. Lightly sand area and apply wax following manufacturer's instructions using clean cotton rags, rubbing in direction of wood grain.
- E. Biennial Cleaning:
    - 1. Damp-wipe woodwork with a soft cloth dampened in clear water.
    - 2. Promptly dry the wood with a soft cloth, rubbing along the grain.
    - 3. Polish by dry rubbing with a soft cloth.
  - F. Fill scratches and gouges with shellac burn-in sticks matching color to the wood stain.
  - G. Apply wax following manufacturer's instructions using clean cotton rags, rubbing in direction of wood grain.
  - H. See also 06400-01-P and 06400-01-R for guidance on the general cleaning of wood surfaces.

**END OF SECTION**

# PATCHING CRACKS AND HOLES IN WOODWORK<sup>14</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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## 06400-16

The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.

### PART 1---GENERAL

#### 1.01 SUMMARY

- A. This procedure includes guidance on patching cracks and small holes in woodwork.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

#### 1.02 REFERENCES

- A. AWI Quality Standard: Comply with applicable requirements of Architectural Woodwork Quality Standards, Premium Grade, published by the Architectural Woodwork Institute (AWI), except as otherwise indicated.

#### 1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: Submit written program for each phase of restoration process including protection of surrounding materials on building during operations. Describe in detail materials, methods, and equipment to be used for each phase of restoration work.

#### 1.04 QUALITY ASSURANCE

- A. Mock-Ups: Prior to start of wood restoration work, prepare the following sample panels in building where directed by the **Cultural Resources POC**. Obtain the **Cultural Resources POCs acceptance** of visual qualities before proceeding with the work. Retain acceptable panels in undisturbed condition, suitably marked, during construction as a standard for judging completed work.
  - 1. Wood Repair: Prepare sample panels for each type of woodwork indicated to be patched, resurfaced, modified, or replaced. Prepare mock-up panels on existing woodwork to demonstrate quality of materials and workmanship.

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<sup>14</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

## 1.05 PROJECT/SITE CONDITIONS

### A. Existing Conditions:

1. Installer shall advise Contractor of temperature and humidity requirements for woodwork installation areas. Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
2. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity conditions.
3. Determine that surfaces to which finishes are to be applied are even, smooth, sound, clean, dry, and free from defects affecting proper application. Correct or report defective surfaces to Contracting Officer.

## PART 2---PRODUCTS

### 2.01 MATERIALS

#### A. Patching Materials:

1. Wood Filler: Standard filler manufactured specifically for restorative patching of woodwork.
  - a. Tint filler to match existing woodwork.
2. Sandpaper: No. 3/0 or No. 5/0 garnet paper.

#### B. Replacement Wood: Match species, grade, grain pattern, and other special characteristics of existing woodwork.

## PART 3---EXECUTION

### 3.01 ERECTION, INSTALLATION, APPLICATION

- A. Remove all minor surface imperfections such as scratches, dents, etc., by rubbing surface with fine grit sandpaper.
- B. Patch all holes and cracks in woodwork with wood filler tinted to match existing wood.
- C. Carefully hand rub filled area with a fine grit sandpaper to match surface characteristics of adjacent woodwork.
- D. Touch-up patch during finishing so that color and other appearance characteristics of filled area match the finish of adjacent woodwork. See 06400-05-R, 06400-06-R, and 06400-10-R for guidance on refinishing.
- E. Patch holes and cracks in woodwork including woodwork damaged from hardware changes with wood plugs or wood patches.
- F. Rout out hole or crack woodwork to receive plus or patch materials.
- G. All repair plugs and patches in wood with a transparent finish shall have grain aligned.

### 3.02 ADJUSTING/CLEANING

- A. Upon completion of this work, all floors, walls, and other adjacent surfaces that are stained, marred, or otherwise damaged by work under this section shall be cleaned and repaired and all work and the adjacent areas shall be left in a clean and perfect condition.
- B. All completed work shall be adequately protected from damage by subsequent building operations and effects of weather. Protection shall be by methods recommended by the manufacturer of installed materials and as approved by the **Cultural Resources POC**.

- C. Repair damaged and defective woodwork wherever possible to eliminate functional and visual defects. Where it is not possible to repair properly, replace woodwork, and adjust joinery for uniform appearance.
- D. Clean woodwork: Dust and damp wipe woodwork with a soft cloth dampened in clean water; dry rub with soft cloth to maintain the polish, rubbing along the grain of the wood.
- E. Stain and Spot Removal:
  - 1. Stains may be cleaned by prompt damp wiping with cloth dampened in clear water or rubbing with cloth dampened in solvent. Dry the wood with a soft cloth.
  - 2. White spots may be removed by rubbing them with a small amount of linseed oil.

END OF SECTION

# REPAIRING WATER-DAMAGED WOODWORK<sup>15</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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## 06400-11

The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.

### PART 1---GENERAL

#### 1.01 SUMMARY

- A. This procedure includes guidance on repairing woodwork stained from minor water damage.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

### PART 2---PRODUCTS

#### 2.01 MATERIALS

- A. Wood stain
- B. Wood bleach: Solution of sodium perborate, hydrogen peroxide, or proprietary mixture suitable for oak.
- C. Wood filler: colored to match wood
- D. Sandpaper: Extra fine grit
- E. Mild cleaner such as "Murphy's Oil Soap"

### PART 3---EXECUTION

#### 3.01 PREPARATION

- A. Surface Preparation:
  - 1. Mask all adjacent surfaces and protect other exposed surfaces in the work area.
  - 2. Fill any splits in existing wood and sand smooth prior to sealer application.

#### 3.02 ERECTION, INSTALLATION, APPLICATION

- A. Select an inconspicuous area on which to test materials and application for each method type required. Test area must be approved by the Contracting Officer.
- B. After each test area has been prepared, receive approval from the Contracting Officer before commencing general application.

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<sup>15</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

- C. Check area with a moisture meter to verify that wood does not have moisture on surface.
- D. Sand stained areas to bare wood.
- E. If bare wood is stained, apply wood bleach to remove stain. Minimize flow of bleach onto areas not stained. Allow to dry and sand wood lightly to remove chemical residue.
- F. Fill wood if required and apply stain of color to match existing.

### 3.03 ADJUSTING/CLEANING

- A. Wash woodwork with mild detergent and water.
- B. Dry immediately with clean cloth.
- C. Finish to match historic finish.

END OF SECTION

# REPLACING DETERIORATED WOODWORK<sup>16</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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## 06400-15

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

### PART 1---GENERAL

#### 1.01 SUMMARY

- A. This procedure includes guidance on wood restoration work including repairing existing woodwork by removing damaged or deteriorated material and replacing with new to match existing.
- B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

#### 1.02 REFERENCES

- A. AWI Quality Standard: Comply with applicable requirements of Architectural Woodwork Quality Standards, Premium Grade, published by the Architectural Woodwork Institute (AWI), except as otherwise indicated.

#### 1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: Submit written program for each phase of restoration process including protection of surrounding materials on building during operations. Describe in detail materials, methods, and equipment to be used for each phase of restoration work.

#### 1.04 QUALITY ASSURANCE

- A. Mock-Ups: Prior to start of wood restoration work, prepare the following sample panels in building where directed by the **Cultural Resources POC**. Obtain the **Cultural Resources POCs** acceptance of visual qualities before proceeding with the work. Retain acceptable panels in undisturbed condition, suitably marked, during construction as a standard for judging completed work.
  - 1. Wood Repair: Prepare sample panels for each type of woodwork indicated to be patched, resurfaced, modified, or replaced. Prepare mock-up panels on existing woodwork to demonstrate quality of materials and workmanship.

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<sup>16</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

## 1.05 PROJECT/SITE CONDITIONS

### A. Existing Conditions:

1. Installer shall advise Contractor of temperature and humidity requirements for woodwork installation areas. Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
2. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity conditions.
3. Determine that surfaces to which finishes are to be applied are even, smooth, sound, clean, dry, and free from defects affecting proper application. Correct or report defective surfaces to Contracting Officer.

## PART 2---PRODUCTS

### 2.01 MATERIALS

#### A. New or Replacement Materials:

1. Wood Moisture Content: Provide kiln-dried lumber with an average moisture content range of 6% to 11% for interior work. Maintain temperature and relative humidity during fabrication, storage, and finishing operations so that moisture content values for woodwork at time of installation do not exceed the above range.
2. Replacement Wood: Match species, grade, grain pattern, and other special characteristics of existing woodwork.

#### B. Clean, soft cloths

## PART 3---EXECUTION

### 3.01 PREPARATION

#### A. Surface Preparation:

1. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.
2. Back prime woodwork on all surfaces, which will be concealed with one coat of wood primer. Schedule delivery to allow time for application and drying of back prime coat before installation of woodwork.
3. Remove miscellaneous hardware, nails, etc., from all existing woodwork as required to provide a first class installation of new or replacement woodwork.
4. Prior to installation of new architectural woodwork, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.

### 3.02 ERECTION, INSTALLATION, APPLICATION

- A. Carefully remove at locations indicated any damaged or deteriorated woodwork. Unless indicated otherwise, replace the entire length of the existing damaged piece to the next butt joint.
- B. For partial replacement of existing pieces, use a neat, well-fitted level cut with grain aligned in transparent finished wood.
- C. Install new pieces as described below:
  1. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims.
  2. Cut to fit unless specified to be shop-fabricated or shop-cut to exact size. Where woodwork abuts other finished work, scribe, and cut for accurate fit. Before making cutouts, drill pilot holes at corners.

3. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, and comply with Quality Standards for joinery.
  4. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is indicated.
- D. Finish replacement woodwork to match adjacent woodwork surfaces. See 06400-05-R and 06400-10-R for guidance.

### 3.03 ADJUSTING/CLEANING

- A. Upon completion of this work, all floors, walls, and other adjacent surfaces that are stained, marred, or otherwise damaged by work under this section shall be cleaned and repaired and all work and the adjacent areas shall be left in a clean and perfect condition.
- B. All completed work shall be adequately protected from damage by subsequent building operations and effects of weather. Protection shall be by methods recommended by the manufacturer of installed materials and as approved by the **Cultural Resources POC**.
- C. Repair damaged and defective woodwork wherever possible to eliminate functional and visual defects. Where it is not possible to repair properly, replace woodwork, and adjust joinery for uniform appearance.
- D. Clean woodwork: Dust and damp wipe woodwork with a soft cloth dampened in clean water; dry rub with soft cloth to maintain the polish, rubbing along the grain of the wood.
- E. Stain and Spot Removal:
  1. Stains may be cleaned by prompt damp wiping with cloth dampened in clear water or rubbing with cloth dampened in solvent. Dry the wood with a soft cloth.
  2. White spots may be removed by rubbing them with a small amount of linseed oil.

END OF SECTION

## 4.8 ROOFING

### 4.8.1 Roofing Elements

#### 4.8.1.1 Roofing— Asphalt Shingles

NR Rating: 114

Description:

The roof shingles are not original to the structure. The roofs on all of the buildings were repaired, and asphalt shingles replaced at some point in the recent past. The grey asphalt shingles cover the entire roof. They are not distinctive nor do they represent a substantial amount of historic fabric. The asphalt shingles are in good condition, but begin to show signs of age. The shingles should be replaced with green asphalt shingles, (matching those in the historic district) when the roof has deteriorated beyond repair.

**Treatment Rating 4: PRESERVE WHERE THERE IS NO COMPELLING REASON FOR REMOVAL**

UNDERTAKE ALL NECESSARY ALTERATION WORK AS SENSITIVELY AS POSSIBLE, INCLUDING ANY DEMOLITION WORK.

Statement of Importance:

- The asphalt shingles date to the World War II period; however, they do not represent a substantial amount of historic fabric, are not distinctive, and do not contribute to the significance, historic appearance, or original construction system of the Black Officers' Club.

Condition: **Good– Preserve**

Fair to good - Preserve

Poor – Replace

#### **Inventory Quantity and Condition**

The shingles are evaluated as Good when:

- the roof shingles, themselves, are intact, structurally sound and performing their intended purpose, and
- any shingles that are damaged should be replaced with like color shingles, and
- the shingle system should be addressed in the areas where water damage is developing.

#### **Minor deficiency of the asphalt shingles exists where:**

- The asphalt shingles should be inspected yearly for wear and localized failure, and
- shingles should be replaced where they are no longer functioning to maximum capacity, and
- if inspection reveals global damage, then entire roof should be replaced.

### 4.8.2 Maintenance / Management Guidelines

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic roofing are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

#### **4.8.2.1 Identify, Retain, and Preserve**

Recommended...

- Identifying, retaining, and preserving roofs--and their functional and decorative features--that is important in defining the overall historic character of the building.
- This includes the roof's shape, such as hipped, gambrel, and mansard; decorative features, such as cupolas, cresting chimneys, and weathervanes; and roofing material such as slate, wood, clay tile, and metal, as well as its size, color, and patterning.

Not Recommended...

- Radically changing, damaging, or destroying roofs, which are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Removing a major portion of the roof or roofing material that is repairable, and then reconstructing it with new material in order to create a uniform or "improved" appearance.
- Changing the configuration of a roof by adding new features such as dormer windows, vents, or skylights so that the historic character is diminished.
- Stripping the roof of sound historic material such as slate, clay tile, wood, and architectural metal.
- Applying paint or other coatings to roofing material, which has been historically uncoated.

#### **4.8.2.2 Protect and Maintain**

Recommended...

- Protecting and maintaining a roof by cleaning the gutters and downspouts and replacing deteriorated flashing. Roof sheathing should also be checked for proper venting to prevent moisture condensation and water penetration; and to insure that materials are free from insect infestation.
- Providing adequate anchorage for roofing material to guard against wind damage and moisture penetration.
- Protecting a leaking roof with plywood and building paper until it can be properly repaired.

Not Recommended...

- Failing to clean and maintain gutters and downspouts properly so that water and debris collect and cause damage to roof fasteners, sheathing, and the underlying structure.
- Allowing roof fasteners, such as nails and clips to corrode so that roofing material is subject to accelerated deterioration.
- Permitting a leaking roof to remain unprotected so that accelerated deterioration of historic building materials—masonry, wood, plaster, paint, and structural members—occurs.

### **4.8.2.3 Repair**

Recommended...

- Repairing a roof by reinforcing the historic materials, which comprise roof features.
- Repairs will also generally include the limited replacement in-kind--or with compatible substitute material--of those extensively deteriorated or missing parts of features when there are surviving prototypes such as cupola louvers, dentils, dormer roofing; or slates, tiles, or wood shingles on a main roof.

Not Recommended...

- Replacing an entire roof feature such as a cupola or dormer when repair of the historic materials and limited replacement of deteriorated or missing parts are appropriate.
- Failing to reuse intact slate or tile when only the roofing substrate needs replacement.
- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the roof or that is physically or chemically incompatible.

### **4.8.2.4 Replace**

Recommended...

- Replacing in-kind an entire feature of the roof that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence as a model to reproduce the feature. Examples can include a large section of roofing, or a dormer or chimney.
- If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

Not Recommended...

- Removing a feature of the roof that is irreparable, such as a chimney or dormer, and not replacing it; or replacing it with a new feature that does not convey the same visual appearance.

# MINOR REPAIRS TO ASPHALT ROLL-ROOFING OR BUILT-UP ROOFING<sup>17</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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07321-01

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## PART 1---GENERAL

### A.01 SUMMARY

- A. This procedure includes guidance on making minor repairs to asphalt and built-up roofing membranes. Some problems include open lap joints, blisters, splits, holes, ridges, undulations, wrinkles, and cracks.

1. Ridges:

NOTE: RIDGES SHOULD BE REPAIRED AS SOON AS POSSIBLE. CONTINUAL STRESS ON A RIDGE CAN LEAD TO SPLITTING OF THE MATERIAL.

- a. Ridges are firm and do not yield under pressure. They may result from the substrate being uneven before the felt was laid, or from moisture distorting the substrate.
- b. Ridging usually occurs over or near joints between boards. The ridges expand as entrapped moisture vaporizes. Ridges become a problem when they interfere with drainage or when the roof begins to leak.

2. Undulations:

- a. Unlike ridging, undulations will yield to pressure.
- b. Distortions of felts may result from the way the rolls were stored (flat instead of on end), inadequate pressure applied while laying, poor application of bitumen compound, or if entrapped moisture becomes vaporized.

3. Blisters:

- a. Blisters will yield to pressure.
- b. Blisters begin with the expansion of trapped air and/or moisture pockets and can result from inadequate pressure during laying.
- c. Full Membrane Blistering: Usually occurs when no separating layer is provided between the asphalt and the substrate.
- d. Inter-layer Blistering:
  - When large blisters result from additional air and water drawn in from outside through the top layer of the felt.
  - Not a common problem, but can result if the 2nd layer does not adhere well to the 1st layer due to the accumulation of dirt or dust.

—OR—

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<sup>17</sup> The following excerpt is from the U.S. General Services Administration (GSA) Technical Procedures. Full documentation can be found at: <http://w3.gsa.gov/web/p/hptp.nsf>

- If a blow develops in the 1st layer, the 2nd layer becomes thin at that point and allows air and moisture to penetrate between the layers. This can create the potential for a blister to develop.

- e. A blister usually develops under the cap sheet of the membrane.
- f. Inter-layer blistering is most common with unsurfaced or mineral surfaced felts on vertical or sloping surfaces. However, high performance membranes can reduce the incidence of this occurring.

4. Top Pitting:

NOTE: NO REMEDIAL TREATMENT IS RECOMMENDED, AS THIS TYPE OF BLISTERING SHOULD NOT AFFECT THE EFFICIENCY OF THE WATERPROOFING.

- a. Miniature surface blistering of the bitumen coating (especially with BS747 Type 1E and 2E mineral-surfaced felts).
- b. The blisters may range in size from 1mm to 3mm.
- c. Top pitting may be caused by:
  - 1) Trapped air and/or moisture in the manufacture of the material.
  - 2) Oliensis: Incompatibility of the saturating bitumen with the coating bitumen (i.e. oils from the coating separate as an incompatible reaction with the saturant bitumen).
- d. If numerous across the surface, the coating may separate from the membrane and result in a loss of surfacing.

5. Cockling:

- a. Rounded ridging usually in line with the length of the material.
- b. Cockles sometimes develop as a result of thermal expansion (especially with Polyester felts, which are heat sensitive). The heat from the bonding bitumen during application can create minor wrinkling or cockles, which usually disappears as the material settles.
- c. Most common in fiber and asbestos base felts as they tend to expand when their moisture content increases.
- d. Cockling is less likely in coated felts especially those with a glass or polyester base.

6. Blowing:

- a. Blows are bubbles that develop on the surface from gas moving through the asphalt. The heat of the asphalt during application causes the air to expand and creates steam by raising the temperature of the moisture.
- b. Blowing is most common in vertical application where there is no separating layer between the asphalt and the substrate.

B. Problems with mineral-surfaced, asphalt roll roofing and built-up roofing membranes are usually related to sun exposure, and excessive moisture. Exposure to the sun may cause the asphalt to dry out; resulting in cracking of the surface, separation of plies, and may eventually require replacement of the entire membrane.

C. The repairs described in this procedure are ONLY temporary. For roofs that are near the end of their useful life, these repairs may provide an extra 3 to 4 years of service, enough time to start planning for a new roof. For roofs that are relatively new, these techniques will provide protection while the cause of the problem is being investigated and repairs that are more permanent are planned.

D. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:

- 1. Safety Precautions
- 2. Historic Structures Precautions
- 3. Submittals

4. Quality Assurance
5. Delivery, Storage and Handling
6. Project/Site Conditions
7. Sequencing and Scheduling
8. General Protection (Surface and Surrounding)

E. For additional information on factors contributing to roof deterioration, see 07500-02-S.

F. For guidance on inspecting for sources of flat roof failures, see 07500-01-S.

#### 1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM), 100 Barr Drive, West Conshohocken, PA 19428, (610) 832-9585 or FAX (610) 832-9555.

#### 1.03 DEFINITIONS

- A. Asphalt--A dark brown to black semi-solid hydrocarbon obtained from crude petroleum. See ASTM D 312-78.
- B. Asphalt cement--Trowelable black asphaltic mastic used for flashing and roof repairs. Contains fiber additives to thicken the mixture so that it will not run down vertical surfaces. Also called roofing cement, flashing cement, plastic asphalt cement, plastic cement, roofing tar, bitumen, and elastic cement.
- C. Bitumen--A semisolid mixture of complex hydrocarbons derived from coal or petroleum, as coal-tar pitch or asphalt; before application, usually dissolved in a solvent, emulsified, or heated to a liquid state.
- D. Built-up roofing--A continuous roof covering made up of laminations or plies of saturated or coated roofing felts, alternated with layers of asphalt or coal-tar pitch and surfaced with a layer of gravel or slag in a heavy coat of asphalt or coal-tar pitch or finished with a cap sheet; generally used on flat or low-pitched roofs.
- E. Bituminous coating--An asphalt or tar compound used to provide a protective finish for a surface.
- F. Coal tar bitumen--A dark brown to black, semi-solid hydrocarbon, a residue distillation of coal tar. It is used for the construction of low-pitch built-up roofs. It differs from coal tar pitch because of a different volatility. See ASTM D, 450, Type III.
- G. Coal tar pitch--Similar to coal tar bitumen. Used for ead-level or low-slope built-up roofs. See ASTM D 450, Type I.
- H. Lap cement--Thinner than asphalt cement, this is used to make watertight joints at the laps of roll roofing.
- I. Roof restorant--The restorant penetrates the existing roofing felts and plasticizes the age-hardened bitumen to its originally installed state. It will not, however, stop or seal leaks. In addition, a deep coating on the surface provides a weathering surface and a binder for the replacement aggregate. Also called roof coating or roof paint.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection:
  1. Store roof system materials in a dry location. Outside, they should be placed on platforms off the ground or roof deck, covered with waterproof coverings, which will not produce condensation.
  2. Store roll materials on end to prevent their becoming deformed or damaged. Remove moisture, dirt, snow, or ice from roofing bitumens before they are heated.

3. Replace lids on cans of material stored on the job site.
4. Protect water-based materials from freezing.

#### 1.05 PROJECT/SITE CONDITIONS

##### A. Environmental Requirements:

1. It is extremely important that the roof deck be dry at the time roofing operations commence, to avoid later problems with water vapor trapped under the membrane. A deck should not be roofed when rain, snow, or frost is present in or on the deck material.
2. Cold temperatures: Apply roofing materials only when correct bitumen temperatures can be maintained. "Wind chill" and surface temperature affects application temperatures. Keep surface temperature and asphalt thermometers at the work site.
3. Hot temperatures: In hot weather the bitumen will cool slowly, which can lead to sticking, making the membrane susceptible to physical damage from mechanical equipment and foot traffic.
4. Wind: Wind can blow hot materials, mastics, and coatings causing damage to surrounding property and making the handling of roll materials difficult.

## PART 2---PRODUCTS

### 2.01 MATERIALS

- A. Sand and/or gravel to match existing or historic appearance.
- B. Asphalt Roof Felts:
  1. BS747 Type 1 fiber base felts - suffer from inter-layer blistering.
  2. Type 2 Asbestos base felts - inter-layer blistering is less common.
  3. Type 3 Glass fiber felts - Extremely resistant to blistering.
  4. Polyester felts - some resistance to blistering.
- C. Asphalt cement Asphalt cement (also called, among others, flashing cement or roofing cement).
- D. Roof Coating (also called roof paint and roof restorant)
- E. 1-1/2" Flathead galvanized roofing nails
- F. Turpentine

### 2.02 EQUIPMENT

- A. Utility knife or hook-nosed linoleum knife
- B. Hammer
- C. Trowel
- D. Stiff bristle brushes (non-metallic)
- E. Long handled brush or broom
- F. Ladders, scaffolding as required

## PART 3---EXECUTION

### 3.01 EXAMINATION

- A. Inspect the surface for obvious cracks, blisters, or ridges in the membrane.
- B. Check also for bald spots, areas where the gravel (built-up roof) or mineral granules (roll roofing) are missing.
- C. Be especially diligent inspecting where the roof meets parapets, chimneys, vents, and other vertical surfaces.
- D. If possible, check the underside of the rafters and decking for water stains or rot, which would indicate water infiltration, realizing that water, could migrate through layers of roof plies from distant points.
- E. Check the interior, especially ceilings and around fireplaces and vent pipe locations, for clues as to the location of any leaks.
- F. See also roofing section of 01800-01-S, "Checklist for the Routine Inspection of Buildings."

### 3.02 PREPARATION

#### A. Protection:

1. When transporting liquid bitumen to the roof, protect adjacent surfaces and permanent equipment by providing masking or covering. Secure coverings without the use of adhesive backed tape or nails. Impervious sheeting, which produces condensation, should not be used.
2. Keep a portable fire extinguisher on hand where work is being done.
3. At the end of each workday, provide temporary roofing when existing roof is being opened for repair or replacement. Provide an effective way to divert water runoff away from open roof.

#### B. Surface Preparation:

1. Sweep exposed felts clean of loose aggregate, dirt, and silt with stiff bristled brush or broom. Sweep at least six inches into embedded aggregate in all directions. Clean all roof surfaces, including parapets, copings, and flashings. Sometimes this can be done using a long-handled push broom. In the case of a tar and gravel roof, you may have to cut the gravel off by hand or use a gravel-removing machine. Parapet cleaning should include brushing of any efflorescence from the brickwork using stiff, non-metallic bristle brushes. Do not begin repair of flashings until completion of all pointing or resetting of parapet units and repair of coping joints.
2. Go over the entire roof area with roofer's chalk, marking areas where repair work is to be done.

### 3.03 EXECUTION, INSTALLATION, APPLICATION

#### A. Repairing open lap joints on roll roofing:

1. Force lap cement or asphalt cement under open seam. Weight it down with heavy weight until it is dry.
2. If it pops again, slit wrinkle being careful not to cut sound layers of roofing below.
  - a. Using 1-1/2 inch galvanized roofing nails secure both sides of the slit.
  - b. Using 90-lb. roofing felt, cut a patch large enough to cover the nail heads with a 2 inch overlap on all sides.
  - c. Coat the back of the patch with asphalt cement and press it into place over the nails.
  - d. Nail the edges of the patch with nails spaced about 1 inch apart and cover the nail heads with more asphalt cement.
  - e. Finish the patch by sprinkling light colored fine gravel or sand over the wet cement.

DO NOT ELIMINATE THIS LAST STEP. THE GRAVEL OR SAND REFLECTS SUNLIGHT THUS SLOWING THE DRYING OUT PROCESS

#### B. Repairing Small Blisters:

1. If no leaks are evident, apply a solar reflective treatment (see Section 3.03 B.3. below).

—OR—

Starcut the blister with a hook-nosed linoleum knife or a utility knife to release trapped air,

- a. If the felt layers beneath the surface are dry, proceed with the repair.
- b. If they are damp, deepen the cut down to the wood sheathing and let the roofing dry out before proceeding. A portable electric eater-fan or hair dryer can be used to speed up the process.
- c. Patch the area and apply a solar reflective treatment (see Section 3.03 B.3. below).

—OR—

Release entrapped moisture by installing drying units with evaporation tubes (see manufacturer's instructions for installation procedures).

2. If leaks are present, allow entrapped moisture to dry and then remove the felts and replace with new.

3. To Prevent Blistering: Apply chippings over the surface (a form a solar reflective treatment): Chippings are usually light colored, of limestone, granite, gravel, calcite or feldspar, 6-10 mm in size set in bitumen compound after the asphalt is laid.
  - a. Advantages of chippings:
    - 1) Helps cool the membrane.
    - 2) Helps hold down the membrane.
  - b. Disadvantages of chippings:
    - 1) Outlets may become blocked.
    - 2) Leaks in roof are difficult to locate and bonded chippings are difficult to remove.
  - c. Alternatives of chippings include mineral-surfaced roofing and liquid-applied surface coatings (very effective on top of glass-base felts, but not so effective with others.

C. Repairing Undulations:

1. One alternative is to remove and relay the roof with new felts.
2. If not a serious problem, that is the problem will not be exacerbated by foot traffic on the roof, then an application of solar reflective treatment should aid in reducing the spread of undulations.

D. Repairing larger damaged areas on either built-up or roll roofing:

1. Cut out damaged plies leaving sound layers in tact.
2. Dip knife in turpentine periodically while cutting to keep the blade free of tar and felt fibers, and pull out the layers of felt individually.
3. If water has soaked the felt, remove all the roofing within the rectangle, down to the sheathing and dry the area thoroughly.
4. With the damaged area removed, apply asphalt cement under loose edges of cuts and over the entire cut out area.
5. Using 90-lb. roofing felt, cut out patches the same size as the cutout. Press first patch into asphalt cement. Apply another coating of asphalt cement to cutout and press another patch into place. Repeat process until the patch is even with the surrounding roof. The number of layers will depend on the depth of the cutout.
6. Cut a final patch of either roofing felt or mineral roll roofing, which will overlap the cutout area by 2 inches on all sides. Cover the bottom of the final patch with asphalt cement, press in place, and nail edges with nails spaced about 3/4 to 1 inch apart. Cover nail heads with asphalt cement and sprinkle fine gravel or sand over, as in A.3.above.

E. Repairing cracks in Asphalt Flashing:

1. Clean the area of any gravel or other debris.
2. Coat area around crack with asphalt cement extending 6 inches beyond crack in all directions.
3. Lay a piece of 90-lb. roofing felt in the cement maintaining the 6-inch overlap.
4. Repeat steps (2) and (3).
5. Finish patch with a final coat of asphalt cement and lay sand or gravel on the horizontal surfaces.

- F. If there are simply bald spots on the surface, sweep up any dirt and debris; paint area with roof coating and re-spread or add more gravel.

NOTE: DO NOT use reflective paints instead of sand or gravel, except on vertical portions of flashing. Though it is not fully understood why, reflective paints encourage wrinkling, a potentially serious form of deterioration.

- G. Inspect patch at least twice a year to make sure it is still sound.

## END OF SECTION

## 4.9 DOORS AND WINDOWS

### 4.9.1 Doors and Windows Elements

#### 4.9.1.1 Doors and Windows—Metal Doors

NR Rating: 115

Description:

Two single metal doors are located on either side of the north elevation and one single metal door is centered on the west elevation. These doors are not original to the structure and their repair should be undertaken sensitive to the original appearance of the building.



All metal doors show signs of age and wear.

#### **Treatment Rating 5: REMOVE/ALTER/REPLACE**

UNDERTAKE ALL NEW WORK AS SENSITIVELY AS POSSIBLE.

Statement of Importance:

- The metal doors are not significant and their design or condition detracts from the historic appearance of the building.

Condition: **Poor – Replace**

Fair to good - Replace

Poor - Replace

#### **Inventory Quantity and Condition**

The doors are evaluated as Poor when:

- the metal doors have replaced the original wood doors on the building, and
- the metal doors should be removed and original wood doors installed and repaired as needed, and
- deterioration of damage affects more than 25% of the element and cannot be adjusted or repaired, and

- the doors show signs of imminent failure or breakdown, and
- the doors require major repair or replacement.

**Minor deficiency of the metal doors exists where:**

- The metal doors should be removed and original wood doors installed and repaired as needed, and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Minor deficiencies can include, but are not limited to: failure of protective paint layer.

**4.9.1.2 Doors and Windows—Wood Doors**

NR Rating: 113

Description:

One double wood four-lite door with wainscoting on the lower half is located on the left side of the east elevation. The door is in poor condition and should be replaced using a similar wood door from the temporary district buildings. This is a valuable resource to be used in any replacement condition.

**Treatment Rating 3: PRESERVE WHEREVER POSSIBLE**

IF TOO DETERIORATED TO SAVE, ELEMENT MUST BE REPLACED WITH COMPATIBLE MATERIAL AND DESIGN.

Statement of Importance:

- The wood door has acquired significance in its own right or makes an important contribution to World War II period levels of significance identified for the property, and
- the wood door makes a significant contribution to the property's historic appearance and as an integral part of the building's historic construction.

Condition: ***Poor – Replace***

Fair to good - Preserve

Poor - Replace

**Inventory Quantity and Condition**

The wood double door is evaluated as Poor when:

- the wood double door on the east facade has deteriorated beyond reasonable repair costs, and
- deterioration of damage affects more than 25% of the element and cannot be adjusted or repaired, and
- waistcoat panels are missing, the paint is seventy-five percent delaminated, and the wood has been weather worn, and
- the door system should be replaced with a wood double door of similar likeness, and

- the doors show signs of imminent failure or breakdown.

**Critical deficiency of the wood doors exists where:**

- The double door has deteriorated to the point where repair is no longer economically feasible, and
- exact replicas of the very same doors are available in the temporary district, and
- these doors should be used to replace the existing double door.

Minor deficiencies can include, but are not limited to: missing elements and paint failure in excess of eighty percent.

**4.9.1.3 Doors and Windows—Metal Windows**

NR Rating: 114

Description:

Painted aluminum double-hung windows are located on all facades of the Black Officers’ Club. They appear to be in reasonable condition and should be maintained regularly.



Metal windows are in good condition.

**Treatment Rating 4: PRESERVE WHERE THERE IS NO COMPELLING REASON FOR REMOVAL**

UNDERTAKE ALL NECESSARY ALTERATION WORK AS SENSITIVELY AS POSSIBLE, INCLUDING ANY DEMOLITION WORK.

Statement of Importance:

- The metal windows are part of an energy related repair done within the last twenty years, and
- they do not contribute to the significance and historic fabric of the Black Officers’ Club as a building from the World War II period.

Condition: ***Good – Preserve***

Fair to good - Preserve

Poor - Replace

**Inventory Quantity and Condition**

The windows are evaluated as Good when:

- the metal windows are intact, though the metal frames are covering the wood frames beneath, and
- the metal framing covering any original wood framing should be removed, and

- the metal windows should be inspected yearly for signs of failure and repaired as needed.

**Minor deficiency of the metal windows exists where:**

- The metal windows are intact, and
- they should be inspected yearly for signs of corrosion that would require cleaning and repainting to prevent more extensive surface damage.

Minor deficiencies can include, but are not limited to: possible paint failure.

**4.9.2 Maintenance / Management Guidelines**

According to *The Secretary of Interior's Standards for Rehabilitation*, the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic roofing are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>

**4.9.2.1 Identify, Retain, and Preserve**

Recommended...

- Identifying, retaining, and preserving windows--and their functional and decorative features--those are important in defining the overall historic character of the building.
- Such features can include frames, sash, muntins, glazing, sills, heads, hoodmolds, paneled or decorated jambs and moldings, and interior and exterior shutters and blinds.
- Conducting an in-depth survey of the conditions of existing windows early in rehabilitation planning so that repair and upgrading methods and possible replacement options can be fully explored.

Not Recommended...

- Removing or radically changing windows which are important in defining the historic character of the building so that, as a result, the character is diminished.
- Changing the number, location, size, or glazing pattern of windows, through cutting new openings, blocking-in windows, and installing replacement sash that do not fit the historic window opening.
- Changing the historic appearance of windows through the use of inappropriate designs, materials, finishes, or colors which noticeably change the sash, depth of reveal, and muntin configuration; the reflectivity and color of the glazing; or the appearance of the frame.
- Obscuring historic window trim with metal or other material.
- Stripping windows of historic material such as wood, cast iron, and bronze.
- Replacing windows solely because of peeling paint, broken glass, stuck sash, and high air infiltration. These conditions, in themselves, are no indication that windows are beyond repair.

### **4.9.2.2 Protect and Maintain**

Recommended...

- Protecting and maintaining the wood and architectural metal which comprise the window frame, sash, muntins, and surrounds through appropriate surface treatments such as cleaning, rust removal, limited paint removal, and re-application of protective coating systems.
- Providing adequate anchorage for roofing material to guard against wind damage and moisture penetration.
- Evaluating the overall condition of materials to determine whether more than protection and maintenance are required, i.e. if repairs to windows and window features will be required.

Not Recommended...

- Failing to provide adequate protection of materials on a cyclical basis so that deterioration of the window material is accelerated.
- Retrofitting or replacing windows rather than maintaining the sash, frame, and glazing.
- Failing to undertake adequate measures to assure the protection of historic windows.

### **4.9.2.3 Repair**

Recommended...

- Repairing window frames and sash by patching, splicing, consolidating or otherwise reinforcing. Such repair may also include replacement in-kind--or with compatible substitute material--of those parts that are either extensively deteriorated or are missing when there are surviving prototypes such as architrave, hoodmolds, ash, sills, and interior or exterior shutters and blinds.

Not Recommended...

- Replacing an entire window when repair of materials and limited replacement of deteriorated or missing parts are appropriate.
- Failing to reuse serviceable window hardware such as brass sash lifts and sash locks.
- Using substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the window or that is physically or chemically incompatible.

### **4.9.2.4 Replace**

Recommended...

- Replacing in-kind an entire window that is too deteriorated to repair using the same sash and pane configuration and other design details. If using the same kind of material is not technically or economically feasible when replacing windows deteriorated beyond repair, then a compatible substitute material may be considered.

Not Recommended...

- Removing a character-defining window that is irreparable and blocking it in, or replacing it with a new window that does not convey the same visual appearance.

# REPAIR OF BOWS OR UNDULATIONS IN A WOOD DOOR FRAME<sup>18</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

08210-02

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**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## **PART 1---GENERAL**

### 1.01 SUMMARY

- A. This procedure includes guidance on realigning a bowed wood doorframe.
- B. A wood doorframe that bows or undulates may result from warping in the frame, building settlement, or pressure in the wall behind the frame.
- C. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage, and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

## **PART 2---PRODUCTS**

### 2.01 MATERIAL

- A. Wooden shims and blocking
- B. 6d and 8d finish nails

### 2.02 EQUIPMENT

- A. Wide blade putty knife and prybar
- B. Hack saw
- C. Hammer and chisel

## **PART 3---EXECUTION**

### 3.01 EXAMINATION

- A. To discern door problem, observe the door open and close a few times. Note the location of any binding or rubbing. Note also if door binds inconsistently from top to bottom or hinge side to latch side.

### 3.02 ERECTION, INSTALLATION, APPLICATION

- A. Check if jamb is secured to framing by carefully twisting and pushing it.

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<sup>18</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at:  
<http://w3.gsa.gov/web/p/hptp.nsf>

- B. Push back high spots where jamb is loose and secure by nailing. Use 8d finish nails for securing the jamb into the frame and 6d finish nails for securing the trim into the jamb.
- C. If jamb cannot be forced back into position, it must be freed from casing and realigned.
  - 1. Carefully loosen casing on less conspicuous side, with a wide blade putty knife and pry bar; insert putty knife blade first and then insert pry bar on top of knife blade, allowing the knife blade to protect the casing.
  - 2. Loosen casing on side that is more noticeable just enough to insert hacksaw and cut nails, which hold the casing to the jamb.
  - 3. Shim out low spots with solid wood wedges or blocking nailed into place through jamb. If necessary nails can be hidden by first removing door stops, nailing blocking into place and renailing stops.
  - 4. Cut down high spots by removing any existing shims and/or chiseling away at any blocking.
  - 5. When jamb is plumb and straight, resecure casing, filling nail holes as necessary.

END OF SECTION

# UNSTICKING A WOOD DOUBLE-HUNG WINDOW SASH<sup>19</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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08610-03

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## **PART 1---GENERAL**

### 1.01 SUMMARY

- A. This procedure includes guidance and procedures required to inspect and loosen a wood sash.
- B. A wood window sash can bind or stick for many reasons including: window nailed shut; accumulation of paint and/or dirt; humidity causing wood expansion; bowed members; weather-stripping too tight; or building settlement. NOTE: Some sash were fixed, installed without operable parts such as single hung sash.
- C. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage, and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

### 1.02 SYSTEM DESCRIPTION

- A. A window sash in proper working order is freely sliding, has balancing and moving apparatus in working order, and has operable sash lock(s) to deter air infiltration. In addition, operable sash often have weather-stripping and adjustable interior stops to allow for seasonal swelling and shrinkage.

## **PART 2---PRODUCTS**

### 2.01 MATERIALS

- A. Replacement stock is available for stop and parting beads. Be sure replacement is an exact duplicate of the original. Milling a new piece may be required.

### 2.02 EQUIPMENT

- A. A device for cutting paint seals such as "Window zipper" (Red Devil), or approved equal; available at hardware stores.

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<sup>19</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at:  
<http://w3.gsa.gov/web/p/hptp.nsf>

- B. A rubber mallet and block of wood for jamb and stop straightening.
- C. Utility knife for cutting paint seals
- D. Paint scraper
- E. Wide putty knife or "window zipper" to break paint seal
- F. Screwdriver and screws to tighten jamb into place
- G. Hand soap or household paraffin for waxing the stop and parting beads
- H. Flat steel pry bar to loosen sash from outside
- I. Carpenter's nippers to remove nails
- J. 1" chisel to scrape paint in channel
- K. Sandpaper
- L. Planer
- M. Nail to secure sash cord/chain
- N. Soap and water

### **PART 3---EXECUTION**

#### **3.01 EXAMINATION**

- A. Determine if sash is an operable design and not fixed.

#### **3.02 ERECTION, INSTALLATION, APPLICATION**

- A. The sash may be nailed shut:
  1. Check around general area of sash for the presence of any nails.
  2. If sash is nailed shut with finish nails, drive them completely through with nail set.
  3. If large headed nails were used, pull them out with carpenter's nippers being careful not to damage wood.
  
- B. The sash may be painted shut:
  1. Break the paint seal between the stops and the sash.
  2. Use a "window zipper" or a wide putty knife with a rubber mallet.
  3. Do this on the inside and outside of the window.
  4. CAREFULLY insert a heavy screwdriver between the sash rail and jamb at groove for sash cord. TAKE CARE NOT TO MAR OR DAMAGE FINISH AND/OR SASH.
  5. Work at both sides of jambs to loosen sash.
  6. If window still will not open, use a pry bar on the outside of the sash. TAKE CARE TO PROTECT THE SASH AND SILL FROM DENTS WITH A WIDE PUTTY KNIFE OR WOOD BLOCKING. INTENSE PRESSURE ON A SMALL AREA SUCH AS THAT FROM A SMALL SCREWDRIVER OR FLAT PRYBAR CAN GOUGE OR DENT THE WOOD.
  
- C. If the window has been opened but is difficult to move:
  1. Remove any dirt from the channel, stops, weather-stripping, and parting bead.
  2. Remove any globs of dried paint from the stops and parting bead with a 1" chisel and sand edges after paint is removed.
  3. Lubricate stops and parting bead with hand soap or household paraffin.
  
- D. If sash still binds, determine the point of friction:
  1. If the friction occurs along the jamb; with a hammer, tap a wood block approximately 6" long 5 or 6 times against the back of channel to force the jamb back into place. If this allows the sash to move more freely, screw the jamb into the jack stud behind at 3" intervals around the point of friction.
  2. If the friction occurs with the stop, use the same procedure as above, but with less force and do not drive screws into the stop.

- E. Problems such as humidity, paint build-up, or weather-stripping applied too tightly require more aggressive repair:
1. If the window is easily operable during dry times of the year but will not work properly during humid times, then humidity is to blame. Repair should not be attempted until the time of year with highest humidity. See section 1.02 A; If the window has adjustable interior stops, it may be desirable to refurbish and restore them to use.
    - a. The sash must be carefully planed and should be done only once.
    - b. Take off as little of the sash surface as possible to make the window operable during all times of the year.
    - c. Remove the sash as described below with the problem of paint build-up.
  2. If the sash binds because of the build-up of layers of paint, remove the paint. To remove the paint properly, first remove the sash:
    - a. Remove the stop; break the paint seal between the inside stop and the window frame. Pry the stop away from the frame with a stiff putty knife, small pry bar, or wide chisel.
    - b. Pull one side of sash out to expose the sash cord/chain.
    - c. Remove cord/chain from both sides of sash. Temporarily secure the end of cord/chain with a nail through the cord/chain and across the pulley hole so that it will not fall into the pocket. Lift out the sash.
    - d. Remove loose paint from all members by sanding, and repaint.
    - e. Reinstall parting bead and sash.
    - f. When reinstalling inner stop, check position in relation to the sash one nail at a time so that sash will fit snugly in place and will not bind or rattle.
    - g. To remove the upper sash - lower the sash; remove the parting bead from the top down; at midpoint, raise the sash and continue. Follow the same procedure as above.
  3. If weather-stripping applied too tightly is suspected to be the problem, removal and reinstallation of weather-stripping will be required.

END OF SECTION

# THE REPAIR OF HISTORIC WOODEN WINDOWS

## PRESERVATION BRIEFS: 9<sup>20</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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**08610-01**

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

John H. Myers

This standard includes the bulk of information contained in the original Preservation Brief developed by the National Park Service. To obtain a complete copy of this brief, including figures and illustrations, please contact:

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Pittsburgh, PA 15250-7954

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### INTRODUCTION

The windows on many historic buildings are an important aspect of the architectural character of those buildings. Their design, craftsmanship, or other qualities may make them worthy of preservation. This is self-evident for ornamental windows, but it can be equally true for warehouses or factories where the windows may be the most dominant visual element of an otherwise plain building. Evaluating the significance of these windows and planning for their repair or replacement can be a complex process involving both objective and subjective considerations. The Secretary of the Interior's Standards for Rehabilitation and the accompanying guidelines call for respecting the significance of original materials and features, repairing and retaining them wherever possible and when necessary, replacing them in-kind. This Brief is based on the issues of significance and repair, which are implicit in the standards, but the primary emphasis is on the technical issues of planning for the repair of windows including evaluation of their physical condition, techniques of repair, and design considerations when replacement is necessary. Much of the technical section presents repair techniques as an instructional guide for the do-it-yourselfer. The information will be useful, however, for the architect, contractor, or developer on large-scale projects. It presents a methodology for approaching the evaluation and repair of existing windows and considerations for replacement, from which the professional can develop alternatives and specify appropriate materials and procedures.

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<sup>20</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at:  
<http://w3.gsa.gov/web/p/hptp.nsf>

## **ARCHITECTURAL OR HISTORICAL SIGNIFICANCE**

Evaluating the architectural or historical significance of windows is the first step in planning for window treatments, and a general understanding of the function and history of windows is vital to making a proper evaluation. As a part of this evaluation, one must consider four basic window functions: admitting light to the interior spaces, providing fresh air and ventilation to the interior, providing a visual link to the outside world, and enhancing the appearance of a building. No single factor can be disregarded when planning window treatments; for example, attempting to conserve energy by closing up or reducing the size of window openings may result in the use of more energy by increasing electric lighting loads and decreasing passive solar heat gains.

Historically the first windows in early American houses were casement windows; that is, they were hinged at the side and opened outward. In the beginning of the eighteenth century, single and double-hung windows were introduced. Subsequently many styles of these vertical sliding sash windows have come to be associated with specific building periods or architectural styles, and this is an important consideration in determining the significance of windows, especially on a local or regional basis. Site specific, regionally oriented architectural comparisons should be made to determine the significance of windows in question. Although such comparisons may focus on specific window types and their details, the ultimate determination of significance should be made within the context of the whole building, wherein the windows are one architectural element.

After all of the factors have been evaluated, windows should be considered significant to a building if they: 1) are original, 2) reflect the original design intent for the building, 3) reflect period or regional styles or building practices, 4) reflect changes to the building resulting from major periods or events, or 5) are examples of exceptional craftsmanship or design. Once this evaluation of significance has been completed, it is possible to proceed with planning appropriate treatments, beginning with an investigation of the physical condition of the windows.

## **PHYSICAL EVALUATION**

The key to successful planning for window treatments is a careful evaluation of existing physical conditions on a unit-by-unit basis. A graphic or photographic system may be devised to record existing conditions and illustrate the scope of any necessary repairs. Another effective tool is a window schedule, which lists all of the parts of each window unit. Spaces by each part allow notes on existing conditions and repair instructions. When such a schedule is completed, it indicates the precise tasks to be performed in the repair of each unit and becomes a part of the specifications. In any evaluation, one should note at a minimum, 1) window location, 2) condition of the paint, 3) condition of the frame and sill, 4) condition of the sash (rails, stiles and muntins), 5) glazing problems, 6) hardware, and 7) the overall condition of the window (excellent, fair, poor, and so forth).

Many factors such as poor design, moisture, vandalism, insect attack, and lack of maintenance can contribute to window deterioration, but moisture is the primary contributing factor in wooden window decay. All window units should be inspected to see if water is entering around the edges of the frame and, if so, the joints or seams should be caulked to eliminate this danger. The glazing putty should be checked for cracked, loose, or missing sections, which allow water to saturate the wood, especially at the joints. The back putty on the interior side of the pane should also be inspected, because it creates a seal, which prevents condensation from running down into the joinery. The sill should be examined to ensure that it slopes downward away from the building and allows water to drain off. In addition, it may be advisable to cut a drip line along the underside of the sill. This almost invisible treatment will ensure proper water run-off, particularly if the bottom of the sill is flat. Any conditions, including poor original design, which permit water to come in contact with the wood or to puddle on the sill, must be corrected as they contribute to deterioration of the window.

One clue to the location of areas of excessive moisture is the condition of the paint. Therefore, each window should be examined for areas of paint failure. Since excessive moisture is detrimental to the paint bond, areas of paint blistering, cracking, flaking, and peeling usually identify points of water penetration, moisture saturation, and potential deterioration. Failure of the paint should not, however, be mistakenly interpreted as a sign that the wood is in poor condition and hence, irreparable. Wood is frequently in sound physical condition beneath unsightly paint.

After noting areas of paint failure, the next step is to inspect the condition of the wood, particularly at the points identified during the paint examination.

Each window should be examined for operational soundness beginning with the lower portions of the frame and sash. Exterior rainwater and interior condensation can flow downward along the window, entering and collecting at points where the flow is blocked. The sill, joints between the sill and jamb, corners of the bottom rails, and muntin joints are typical points where water collects and deterioration begins. The operation of the window (continuous opening and closing over the years and seasonal temperature changes) weakens the joints, causing movement and slight separation. This process makes the joints more vulnerable to water, which is readily absorbed into the end-grain of the wood. If severe deterioration exists in these areas, it will usually be apparent on visual inspection, but other less severely deteriorated areas of the wood may be tested by two traditional methods using a small ice pick.

An ice pick or an awl may be used to test wood for soundness. The technique is simply to jab the pick into a wetted wood surface at an angle and pry up a small section of the wood. Sound wood will separate in long fibrous splinters, but decayed wood will lift up in short irregular pieces due to the breakdown of fiber strength.

Another method of testing for soundness consists of pushing a sharp object into the wood, perpendicular to the surface. If deterioration has begun from the hidden side of a member and the core is badly decayed, the visible surface may appear to be sound wood. Pressure on the probe can force it through an apparently sound skin to penetrate deeply into decayed wood. This technique is especially useful for checking sills where visual access to the underside is restricted.

Following the inspection and analysis of the results, the scope of the necessary repairs will be evident and a plan for the rehabilitation can be formulated. Generally the actions necessary to return a window to "like new" condition will fall into three broad categories: 1) routine maintenance procedures, 2) structural stabilization, and 3) parts replacement. These categories will be discussed in the following sections and will be referred to respectively as Repair Class I, Repair Class II, and Repair Class III. Each successive repair class represents an increasing level of difficulty, expense, and work time. Note that most of the points mentioned in Repair Class I are routine maintenance items and should be provided in a regular maintenance program for any building. The neglect of these routine items can contribute too many common window problems.

Before undertaking any of the repairs mentioned in the following sections all sources of moisture penetration should be identified and eliminated, and all existing decay fungi destroyed in order to arrest the deterioration process. Many commercially available fungicides and wood preservatives are toxic, so it is extremely important to follow the manufacturer's recommendations for application, and store all chemical materials away from children and animals. After fungicidal and preservative treatment the windows may be stabilized, retained, and restored with every expectation for a long service life.

## **REPAIR CLASS I: ROUTINE MAINTENANCE REPAIRS**

Repairs to wooden windows are usually labor intensive and relatively uncomplicated. On small-scale projects, this allows the do-it-yourselfer to save money by repairing all or part of the windows. On larger projects, it presents the opportunity for time and money, which might otherwise be spent on the removal and replacement of existing windows, to be spent on repairs, subsequently saving all or part of the material cost of new window units. Regardless of the actual costs, or who performs the work, the

evaluation process described earlier will provide the knowledge from which to specify an appropriate work program, establish the work element priorities, and identify the level of skill needed by the labor force.

The routine maintenance required to upgrade a window to "like new" condition normally includes the following steps: 1) some degree of interior and exterior paint removal, 2) removal and repair of sash (including reglazing where necessary), 3) repairs to the frame, 4) weather-stripping and reinstallation of the sash, and 5) repainting. Historic windows have usually acquired many layers of paint over time. Removal of excess layers or peeling and flaking paint will facilitate operation of the window and restore the clarity of the original detailing. Some degree of paint removal is also necessary as a first step in the proper surface preparation for subsequent refinishing (if paint color analysis is desired, it should be conducted prior to the onset of the paint removal). There are several safe and effective techniques for removing paint from wood, depending on the amount of paint to be removed. Several techniques such as scraping, chemical stripping, and the use of a hot air gun are discussed in "Preservation Briefs: 10 Paint Removal from Historic Woodwork" (see 09910-01-S).

Paint removal should begin on the interior frames, being careful to remove the paint from the interior stop and the parting bead, particularly along the seam where these stops meet the jamb. This can be accomplished by running a utility knife along the length of the seam, breaking the paint bond. It will then be much easier to remove the stop, the parting bead, and the sash. The interior stop may be initially loosened from the sash side to avoid visible scarring of the wood and then gradually pried loose using a pair of putty knives, working up and down the stop in small increments. With the stop removed, the lower or interior sash may be withdrawn. The sash cords should be detached from the sides of the sash and their ends may be pinned with a nail or tied in a knot to prevent them from falling into the weight pocket.

Removal of the upper sash on double-hung units is similar but the parting bead, which holds it in place, is set into a groove in the center of the stile and is thinner and more delicate than the interior stop. After removing any paint along the seam, the parting bead should be carefully pried out and worked free in the same manner as the interior stop. The upper sash can be removed in the same manner as the lower one and both sash taken to a convenient work area (in order to remove the sash the interior stop and parting bead need only be removed from one side of the window). Window openings can be covered with polyethylene sheets or plywood sheathing while the sash are out for repair.

The sash can be stripped of paint using appropriate techniques, but if any heat treatment is used, the glass should be removed or protected from the sudden temperature change, which can cause breakage. An overlay of aluminum foil on gypsum board or asbestos can protect the glass from such rapid temperature change. It is important to protect the glass because it may be historic and often adds character to the window. Deteriorated putty should be removed manually, taking care not to damage the wood along the rabbet. If the glass is to be removed, the glazing points, which hold the glass in place, can be extracted and the panes numbered and removed for cleaning and reuse in the same openings. With the glass panes out, the remaining putty can be removed and the sash can be sanded, patched, and primed with a preservative primer. Hardened putty in the rabbets may be softened by heating with a soldering iron at the point of removal. Putty remaining on the glass may be softened by soaking the panes in linseed oil, and then removed with less risk of breaking the glass. Before reinstalling the glass, a bead of glazing compound or linseed oil putty should be laid around the rabbet to cushion and seal the glass. Glazing compound should only be used on wood which has been brushed with linseed oil and primed with an oil based primer or paint. The pane is then pressed into place and the glazing points are pushed into the wood around the perimeter of the pane. The final glazing compound or putty is applied and beveled to complete the seal. The sash can be refinished as desired on the inside and painted on the outside as soon as a "skin" has formed on the putty, usually in 2 or 3 days. Exterior paint should cover the beveled glazing compound or putty and lap over onto the glass slightly to complete a weather tight seal. After the proper curing times have elapsed for paint and putty, the sash will be ready for reinstallation.

While the sash are out of the frame, the condition of the wood in the jamb and sill can be evaluated. Repair and refinishing of the frame may proceed concurrently with repairs to the sash, taking advantage of the curing times for the paints and putty used on the sash. One of the most common work items is the replacement of the sash cords with new rope cords or with chains. The weight pocket is frequently accessible through a door on the face of the frame near the sill, but if no door exists, the trim on the

interior face may be removed for access. Sash weights may be increased for easier window operation by elderly or handicapped persons.

Additional repairs to the frame and sash may include consolidation or replacement of deteriorated wood. Techniques for these repairs are discussed in the following sections.

The operations just discussed summarize the efforts necessary to restore a window with minor deterioration to "like new" condition. The techniques can be applied by an unskilled person with minimal training and experience. To demonstrate the practicality of this approach, and photograph it, a Technical Preservation Services staff member repaired a wooden double-hung, two over two windows, which had been in service over ninety years. The wood was structurally sound but the window had one broken pane, many layers of paint, broken sash cords, and inadequate, worn-out weather-stripping. The staff member found that the frame could be stripped of paint and the sash removed quite easily. Paint, putty, and glass removal required about one hour for each sash, and the reglazing of both sashes was accomplished in about one hour. Weather-stripping of the sash and frame, replacement of the sash cords and reinstallation of the sash, parting bead, and stop required an hour and a half. These times refer only to individual operations; the entire process took several days due to the drying and curing times for putty, primer, and paint, however, work on other window units could have been in progress during these lag times.

## **REPAIR CLASS II: STABILIZATION**

The preceding description of a window repair job focused on a unit, which was operationally sound. Many windows will show some additional degree of physical deterioration, especially in the vulnerable areas mentioned earlier, but even badly damaged windows can be repaired using simple processes. Partially decayed wood can be waterproofed, patched, built-up, or consolidated and then painted to achieve a sound condition, good appearance, and greatly extended life. Three techniques for repairing partially decayed or weathered wood are discussed in this section, and all three can be accomplished using products available at most hardware stores.

One established technique for repairing wood which is split, checked or shows signs of rot, is to: 1) dry the wood, 2) treat decayed areas with a fungicide, 3) waterproof with two or three applications of boiled linseed oil (applications every 24 hours), 4) fill cracks and holes with putty, and 5) after a "skin" forms on the putty, paint the surface. Care should be taken with the use of fungicide, which is toxic. Follow the manufacturers' directions and use only on areas, which will be painted. When using any technique of building up or patching a flat surface, the finished surface should be sloped slightly to carry water away from the window and not allow it to puddle. Caulking of the joints between the sill and the jamb will help reduce further water penetration.

When sills or other members exhibit surface weathering they may also be built-up using wood putties or homemade mixtures such as sawdust and resorcinol glue, or whiting and varnish. These mixtures can be built up in successive layers, then sanded, primed, and painted. The same caution about proper slope for flat surfaces applies to this technique.

Wood may also be strengthened and stabilized by consolidation; using semi-rigid epoxies which saturate the porous decayed wood and then harden. The surface of the consolidated wood can then be filled with a semi-rigid epoxy-patching compound, sanded, and painted. Epoxy patching compounds can be used to build up missing sections of decayed ends of members. Profiles can be duplicated using hand molds, which are created by pressing a ball of patching compound over a sound section of the profile, which has been rubbed with butcher's wax. This can be a very efficient technique where there are many typical repairs to be done. Technical Preservation Services has published "Epoxies for Wood Repairs in Historic Buildings" by Morgan Phillips and Judith Selwyn (1978), which discusses the theory and techniques of epoxy repairs. The process has been widely used and proven in marine applications and proprietary products are available at hardware and marine supply stores. Although epoxy materials may be comparatively expensive, they hold the promise of being among the most durable and long lasting materials available for wood repair.

Any of the three techniques discussed can stabilize and restore the appearance of the window unit. There are times, however, when the degree of deterioration is so advanced that stabilization is impractical, and the only way to retain some of the original fabric is to replace damaged parts.

### **REPAIR CLASS III: SPLICES AND PARTS REPLACEMENT**

When parts of the frame or sash are so badly deteriorated that they cannot be stabilized, there are methods, which permit the retention of some of the existing or original fabric. These methods involve replacing the deteriorated parts with new matching pieces, or splicing new wood into existing members. The techniques require more skill and are more expensive than any of the previously discussed alternatives. It is necessary to remove the sash and/or the affected parts of the frame and have a carpenter or woodworking mill reproduce the damaged or missing parts. Most millwork firms can duplicate parts, such as muntins, bottom rails, or sills, which can then be incorporated into the existing window, but it may be necessary to shop around because there are several factors controlling the practicality of this approach. Some woodworking mills do not like to repair old sash because nails or other foreign objects in the sash can damage expensive knives (which cost far more than their profits on small repair jobs); others do not have cutting knives to duplicate muntin profiles. Some firms prefer to concentrate on larger jobs with more profit potential and some may not have a craftsman who can duplicate the parts. A little searching should locate a firm which will do the job, and at a reasonable price. If such a firm does not exist locally, there are firms, which undertake this kind of repair and ship nationwide. It is possible, however, for the advanced do-it-yourselfer or craftsman with a table saw to duplicate molding profiles using techniques discussed by Gordie Whittington in "Simplified Methods for Reproducing Wood Mouldings," Bulletin of the Association for Preservation Technology, Vol. III, No. 4, 1971, or illustrated more recently in *The Old House*, Time-Life Books, Alexandria, Virginia, 1979.

The repairs discussed in this section involve window frames, which may be in much deteriorated condition, possibly requiring removal; therefore, caution is in order. The actual construction of wooden window frames and sash is not complicated. Pegged mortise and tenon units can be disassembled easily, if the units are out of the building. The installation or connection of some frames to the surrounding structure, especially masonry walls, can complicate the work immeasurably, and may even require dismantling of the wall. It may be useful, therefore, to take the following approach to frame repair: 1) conduct regular maintenance of sound frames to achieve the longest life possible, 2) make necessary repairs in place wherever possible, using stabilization and splicing techniques, and 3) if removal is necessary, thoroughly investigate the structural detailing and seek appropriate professional consultation.

Another alternative may be considered if parts replacement is required, and that is sash replacement. If extensive replacement of parts is necessary and the job becomes prohibitively expensive, it may be more practical to purchase new sash, which can be installed into the existing frames. Such sash are available as exact custom reproductions, reasonable facsimiles (custom windows with similar profiles), and contemporary wooden sash, which are similar in appearance. There are companies, which still manufacture high quality wooden sash, which would duplicate most historic sash. A few calls to local building suppliers may provide a source of appropriate replacement sash, but if not, check with local historical associations, the state historic preservation office, or preservation related magazines and supply catalogs for information. If a rehabilitation project has a large number of windows such as a commercial building or an industrial complex, there may be less of a problem arriving at a solution. Once the evaluation of the windows is completed and the scope of the work is known, there may be a potential economy of scale. Woodworking mills may be interested in the work from a large project; new sash in volume may be considerably less expensive per unit; crews can be assembled and trained on site to perform all of the window repairs; and a few extensive repairs can be absorbed (without undue burden) into the total budget for a large number of sound windows. While it may be expensive for the average historic homeowner to pay seventy dollars or more for a mill to grind a custom knife to duplicate four or five bad muntins, that cost becomes negligible on large commercial projects, which may have several hundred windows.

Most windows should not require the extensive repairs discussed in this section. The ones, which do, are usually in buildings, which have been abandoned for long periods or have totally lacked maintenance for

years. It is necessary to thoroughly investigate the alternatives for windows, which do require extensive repairs to arrive at a solution, retain historic significance, and which are economically feasible. Even for projects requiring repairs identified in this section, if the percentage of parts replacement per window is low, or the number of windows requiring repair is small, repair can still be a cost effective solution.

## **WEATHERIZATION**

A window that is repaired should be made as energy efficient as possible by the use of appropriate weather-stripping to reduce air infiltration. A wide variety of products are available to assist in this task. Felt may be fastened to the top, bottom, and meeting rails, but may have the disadvantage of absorbing and holding moisture, particularly at the bottom rail. Rolled vinyl strips may also be tacked into place in appropriate locations to reduce infiltration. Metal strips or new plastic spring strips may be used on the rails and, if space permits, in the channels between the sash and jamb. Weather-stripping is an historic treatment, but old weather-stripping (felt) is not likely to perform very satisfactorily. Appropriate contemporary weather-stripping should be considered an integral part of the repair process for windows. The use of sash locks installed on the meeting rail will ensure that the sash are kept tightly closed so that the weather-stripping will function more effectively to reduce infiltration. Although such locks will not always be historically accurate, they will usually be viewed as an acceptable contemporary modification in the interest of improved thermal performance.

Many styles of storm windows are available to improve the thermal performance of existing windows. The use of exterior storm windows should be investigated whenever feasible because they are thermally efficient, cost-effective, reversible, and allow the retention of original windows (see 01100-04-S "Preservation Briefs: 3 Conserving Energy in Historic Buildings"). Storm window frames may be made of wood, aluminum, vinyl, or plastic; however, the use of unfinished aluminum storms should be avoided. The visual impact of storms may be minimized by selecting colors that match existing trim color. Arched top storms are available for windows with special shapes. Although interior storm windows appear to offer an attractive option for achieving double-glazing with minimal visual impact, the potential for damaging condensation problems must be addressed. Moisture, which becomes trapped between the layers of glazing, can condense on the colder, outer prime window, potentially leading to deterioration. The correct approach to using interior storms is to create a seal on the interior storm while allowing some ventilation around the prime window. In actual practice, the creation of such a durable, airtight seal is difficult.

## **WINDOW REPLACEMENT**

Although the retention of original or existing windows is always desirable and this Brief is intended to encourage that goal, there is a point when the condition of a window may clearly indicate replacement. The decision process for selecting replacement windows should not begin with a survey of contemporary window products, which are available as replacements, but should begin with a look at the windows, which are being replaced. Attempt to understand the contribution of the window(s) to the appearance of the facade including: 1) the pattern of the openings and their size; 2) proportions of the frame and sash; 3) configuration of window panes; 4) muntin profiles; 5) type of wood; 6) paint color; 7) characteristics of the glass; and 8) associated details such as arched tops, hoods, or other decorative elements. Develop an understanding of how the window reflects the period, style, or regional characteristics of the building, or represents technological development.

Armed with an awareness of the significance of the existing window, begin to search for a replacement, which retains as much of the character of the historic window as possible. There are many sources of suitable new windows. Continue looking until an acceptable replacement can be found. Check building supply firms, local woodworking mills, carpenters, preservation oriented magazines, or catalogs or suppliers of old building materials, for product information. Local historical associations and state historic preservation offices may be good sources of information on products, which have been used successfully in preservation projects.

Consider energy efficiency as one of the factors for replacements, but do not let it dominate the issue. Energy conservation is no excuse for the wholesale destruction of historic windows, which can be made thermally efficient by historically, and aesthetically acceptable means. In fact, an historic wooden window with a high quality storm window added should thermally outperform a new double glazed metal window that does not have thermal breaks (insulation between the inner and outer frames intended to break the path of heat flow). This occurs because the wood has far better insulating value than the metal, in addition, many historic windows have high ratios of wood to glass, thus reducing the area of highest heat transfer. One measure of heat transfer is the U-value, the number of Btu's per hour transferred through a square foot of material. When comparing thermal performance, the lower the U-value the better the performance. According to ASHRAE 1977 Fundamentals, the U-values for single glazed wooden windows range from 0.88 to 0.99. The addition of a storm window should reduce these figures to a range of 0.44 to .049. A non-thermal break, double-glazed metal window has a U-value of about 0.6.

## **CONCLUSION**

Technical Preservation Services recommends the retention and repair of original windows whenever possible. We believe that the repair and weatherization of existing wooden windows is more practical than most people realize, and that many windows are unfortunately replaced because of a lack of awareness of techniques for evaluation, repair, and weatherization. Wooden windows, which are repaired and properly maintained, will have greatly extended service lives while contributing to the historic character of the building. Thus, an important element of a building's significance will have been preserved for the future.

END OF SECTION

# SEALING LEAKY WOOD DOUBLE-HUNG WINDOWS<sup>21</sup>

U.S. General Services Administration  
Historic Preservation Technical Procedures

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08611-01

**The Cultural Resources POC, DPW will review all proposed work; in addition, these guidelines must be reviewed and followed by all personnel prior to performing this procedure.**

## **PART 1---GENERAL**

### 1.01 SUMMARY

- A. This procedure includes guidance on sealing leaky windows and includes caulking gaps between the wall and the frame, filling cracks in the wood, repainting and replacing loose window putty.
- B. Peeling paint, the absence of putty, and open sash joints are signs of moisture infiltration into the window sash. The wood should be properly sealed against moisture to prevent deterioration in wood.
- C. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
  - 1. Safety Precautions
  - 2. Historic Structures Precautions
  - 3. Submittals
  - 4. Quality Assurance
  - 5. Delivery, Storage, and Handling
  - 6. Project/Site Conditions
  - 7. Sequencing and Scheduling
  - 8. General Protection (Surface and Surrounding)

## **PART 2---PRODUCTS**

### 2.01 MATERIALS

- A. Caulking Compound (in order of recommended usage):
  - 1. Polyurethanes - easily workable; paintable; 15-20 year life span; limited availability.
  - 2. Polysulfides - slow drying; can be sanded and painted; highly elastic; limited availability.
  - 3. Butyls - paintable but cannot be sanded; 7-10 year life span.
  - 4. Silicones - some can be painted but generally not sanded.
  - 5. Acrylic Latex - for exterior work, their use is best left to tight, narrow joints; short life span especially when compared to polysulfides and polyurethanes.
- B. Polyethylene foam backer rod such as "Ethafoam" SB brand backer rod (available at builder's supply houses or concrete materials suppliers), or approved equal.
- C. Linseed oil
- D. Wood filler (there are four basic types):

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<sup>21</sup> The following excerpt is from the U.S. General Services Administration (GSA). Full documentation can be found at:  
<http://w3.gsa.gov/web/p/hptp.nsf>

1. Water-mix Wood Putty: Easy to tint and fairly resilient, but has poor moisture resistance.
2. Solvent-based Wood Filler: Not tintable, but has many color choices. A solvent is needed to clean any excess or spills. It is difficult to sand, but has good adhesion and moisture resistance. It also has a problem with shrinkage.
3. Acrylic Latex Wood Filler: Better than water-based in adhesion, moisture resistance, and flexibility. Apply the filler in layers to avoid shrinkage.
4. Two-part Polyester Filler: Similar to auto body filler. It has excellent adherence and moisture resistance with minimal shrinkage. It stains easily, but is time consuming to prepare.

E. Wood water-repellent preservative (see 06310-01-P, Section 2.02 Materials, and 06310-01-S)

F. Paint (see 06300-01-S)

G. Linseed oil putty

H. Clean, potable water

## 2.02 EQUIPMENT

A. Wire brush

B. Natural bristle brushes for oil-based paints: Precondition by soaking in raw linseed oil for 24 hours. Use nylon bristle brushes for water-based paint. Do not use the same brush for both types of paint.

C. Putty knife

D. Caulking gun

## PART 3---EXECUTION

### 3.01 EXAMINATION

A. Inspect windows periodically, at least yearly. Check for ease of operation, presence, and operation of all hardware, and cracked or missing putty and glazing.

### 3.02 ERECTION, INSTALLATION, APPLICATION

A. Recaulking Gaps Between Window Frame and Wall:

1. Re-nail any loose boards in the window frame.
2. Using a wire brush and putty knife, remove any loose dirt and debris that may have collected in the gap.
3. For gaps 3/8 inches or wider, insert a closed-cell polyurethane backer rod.
4. Push the backer rod into the joint to fill up the space behind the caulking.
5. Fill gap with a flexible caulking or sealant. Apply with a caulking gun until flush with the surface.
6. If an oil-based caulk is used, allow the caulk to dry for at least 48 hours and then paint. Paint will extend the life of oil-based paint.

B. Fill holes and cracks with linseed oil and fill with putty (see 06440-04-R for guidance).

C. Examine condition of paint.

1. If paint has minor cracking or peeling, remove loose paint with a wire brush and putty knife and repaint.
2. If paint deterioration is extensive:

- a. Remove all paint from window (see 06400-07-R and 06400-09-R for guidance).
- b. Liberally apply a wood preservative to the wood (see 06310-01-P for guidance). This acts as a primer for the paint.
- c. Allow to dry for 24 hours.
- d. Apply 2 thin coats of paint and allow to dry (see 06300-01-S, 06300-02-R, and 09900-07-S for guidance).

D. Replace Window Putty:

1. Remove loose or cracked putty using a putty knife.
2. Using a wire brush, remove loose dirt and debris from within the putty channel.
3. Brush exposed areas with linseed oil. This will be absorbed into the wood and prevent the new putty from drying too quickly and cracking.
4. Apply fresh window putty and smooth out with a putty knife.

END OF SECTION

## 4.10 FURNISHING

### 4.10.1 Furnishing Elements

#### 4.10.1.1 Furnishings—Mural

NR Rating: 111

Description:

The mural above the fireplace was painted by Samuel Albert Countee during the World War II time period and contributes to the significance and historic appearance of the Black Officers' Club because it is artistically distinctive.



The mural above the fireplace is in good condition and should be repaired as needed by a qualified professional.

#### **Treatment Rating 1: PRESERVE.**

Statement of Importance:

- The mural is associated with those qualities for which the Black Officers' Club was designated a historic property, and
- the mural contributes to the significance and historic appearance of the Black Officers' Club as a building from the World War II period, and
- the mural is artistically distinctive and has a high level of historic integrity.

Condition: **Good – Preserve**

Fair to good - Preserve

Poor - Preserve

#### **Inventory Quantity and Condition**

An element is evaluated as Good when:

- the mural is intact and in excellent condition, and
- inspection every five years by a professional is recommended, and
- cleaning and repair of mural will result only from professional recommendation, and
- any repair or maintenance of the mural is to be executed by a qualified professional.

**Minor deficiency of the mural exists where:**

- The mural should only be inspected and only treated by qualified restoration specialist, and
- the mural should be inspected every ten years, and
- treatment should be decided only by qualified professional trained in the restoration of art and artifacts.

Minor deficiencies can include, but are not limited to: negligible cracking in the oil painting.















# REPORT DOCUMENTATION PAGE

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