Historic Preservation Commission

November 07, 2022 at 4:00 PM
1001 11th Avenue, City Center South, Greeley, CO 80631

Agenda

1. Call to Order
2. Roll Call
3. Approval of the Agenda
4. Approval of the Minutes dated August 15, 2022
5. Chair and Vice Chair Elections
6. Report from Historic Greeley Inc.
7. A public hearing to consider a Certificate of Approval for Exterior Alterations at 827 10th Street (stucco removal and various) (HPDR2022-0010)
8. A public hearing to consider a Certificate of Approval for Exterior Alterations at 1303 9th Avenue (porch rehabilitation) (HPDR2022-0011)
9. Commission Member Reports
10. Staff Report
11. Adjournment

Historic Preservation Public Hearing Procedure

Public Hearing to…

1. Chair introduce public hearing item
2. Historic Preservation Staff report
3. Applicant Presentation
4. Commission questions
5. Chair opens public hearing
6. Chair closes public hearing
7. Applicant rebuttal
8. Commission discussion and vote

City of Greeley, Colorado
HISTORIC PRESERVATION COMMISSION PROCEEDINGS
Regular Meeting

August 15, 2022

1. Call to Order

2. Roll Call

Chair Brunswig called the meeting to order at 4:00 p.m.

The hearing clerk called the roll.

PRESENT
Chair Bob Brunswig
Commissioner Doran Azari
Commissioner Christen DePetro
Commissioner Sean Jaehn
Commissioner Dan Podell
Commissioner Melissa Sizemore

One vacancy exists.

3. Approval of Agenda

Elizabeth Kellums, Planner III – Historic Preservation, indicated that there were no additions or corrections to the agenda, and it was approved as presented.

4. Approval of July 18, 2022, Minutes

Ms. Kellums indicated there was minor corrections Commissioner Podell moved to approve the minutes as amended dated July 18, 2022. Commissioner Azari seconded the motion. Motion carried 6-0. One vacancy exists.

5. Speak Up Greeley Presentation

Ms. Kellums welcomed Sam Haas, City of Greeley Public Engagement and Participation Manager. Ms. Haas went into the background about the Communication and Engagement Department and what they offer for participate and engagement. She handed the commission a handout about Speak Up Greeley. Ms. Haas explained the issue on how the community does not have a way engage in a conversation about certain topics or they do not have a way to express the issues that matter them. Communication and Engagement has done surveys with citizens and the data has shown how the

main preference of communication is online since it is more accessible to most of the community. Speak up Greeley is a website that can reach the audience that cannot attend a public meeting and still be able to give feedback on city projects. Ms. Haas mentioned that with this website the City would be able to help stop spread of misinformation and have a one stop shop for communication. Utilizing this website will help make decision making more effective with having more of the community input. Speak up Greeley is a great tool to see who is engaging with each topic. Ms. Haas went into detail on how the website looks and had a demonstration of the website for the commissioners She asked the commissioners to share about Speak Up Greeley to get the word out about the website. Commissioner Azari asked if when the public writes a question on the website, can everyone see that question and who reviews the questions. Ms. Haas showed an example on how the public can interact with the questions and one of the City's communication specialists can respond to the questions. Commissioner Azari also asked if the website is linked to any other social media. Ms. Haas advised that it was not linked to social media at this time since it is monitored by the City, and they are able to see who is engaging in the conversation which they would not be able to if it was linked to any social media. Chair Brunswig had some idea on how the website would be useful for Historical Preservation Commission.

6. Report from Historic Greeley Inc.

Marshall Clough, 1619 14th Street, came up to give an update on Historic Greeley Inc. He had two items he wanted to go over. First, he mentioned the annual member's meeting that is going to be held September 17th from 9 am to 11 am. This meeting is to look at the accomplishments that happened in the last year and go over future projects. Mr. Clough went over the second item, the project they are working on right now, the Weekend Presentation Project. This project is to help the community who have older homes with expertise and volunteer for minor help to make their buildings more presentable. They plan to decide on the finalist within the following weeks, and the project will take place the weekend of October 1st.

7. Staff Reports

Ms. Kellums gave an update on getting a historic resource survey for the Sunrise area. She mentioned she is getting several estimates from companies to have different options to choose from. The area she wants to get surveyed is all of Sunrise area which is from 5th Street to 16th Street and highway 85 bypass to the railroad tracks. Ms. Kellums is hoping to get 10 percent intensive level which will be better for the community. The budget will determine what the survey scope will be for the area. The cost of the survey may be upwards of one hundred thousand dollars. Ms. Kellums said there is some money set aside for Historic Preservation. Ms. Kellums is filing paperwork for a grant which the deadline for October 1st. She will be submitting a letter of intent and if that goes well, she will be finalizing the application. The Cranford survey has a consultant on board,

Metcalf Archaeological Consultants, which will be having a neighborhood meeting to kick-off the project. It will be a public meeting held on September 21st in the City Council overflow room. This project will have 72 properties surveyed at the reconnaissance level. Finally, the CPI conference for 2023 has been scheduled for February 8th though the 10th in Boulder. Ms. Kellums mentioned how the website for the conference was asking for people to participate in the conference planning committee and if the commissioners would be interested in participating.

8. Commission Member Reports

Chair Brunswig welcomed Commissioner Sizemore to the Historic Preservation Commission. Chair Brunswig mentioned how he is excited to see the project for Canford get started.

9. Adjournment

With no further business before the Commission, Chair Brunswig adjourned the meeting at 4:42 p.m.

_____

Bob Brunswig, Chair

_____

Elizabeth Kellums, Secretary

Historic Preservation Commission Agenda Summary

November 7, 2022

Key Staff Contact: Elizabeth Kellums, Planner III – Historic Preservation, 970/350-9222

Title:
Public Hearing for Request for Certificate of Approval for Exterior Alterations at 827 10th Street

Summary:
Property owner and applicant Ashley Fusco requests approval to remove the non-historic stucco from the façade at 827 10th Street, clean the brick and repoint mortar joints as needed, paint the sign band if needed, replace the existing awning with a retractable awning, and install gooseneck light fixtures.

Recommended Action:
Staff recommends approval of the stucco removal, installation of a retractable awning and installation of gooseneck light fixtures. Staff further recommends conditional approval of the brick cleaning and mortar repointing with the applicant working with Staff to test the brick cleaner and determine if it will not damage the brick, as well as ensure the mortar mix for the repointing is compatible with existing mortar. Staff recommends the applicant work with the Staff to determine if painting of the sign band is needed. If determined to be needed, Staff recommends approval of the painting of the sign band.

Attachments:
Staff Report
Attachment A – Application & Narrative for Certificate of Approval
Attachment B – Current Photographs
Attachment C – Historic Photograph
Attachment D – Prosoco Sure Klean 600 product information
Attachment E – Existing Site Map
Attachment F – Architectural Inventory Form for 827 10th Street
Attachment G – Preservation Brief #1 – Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings
Attachment H – Preservation Brief #2 – Repointing Mortar Joints in Historic Masonry Buildings

HISTORIC PRESERVATION COMMISSION SUMMARY

ITEM: Certificate of Approval for Major Alteration

CASE NUMBER: HPDR2022-0010

PROJECT: Exterior Alterations

LOCATION: 827 10th Street

APPLICANT: Ashley Fusco, representative of property owner 820 LTD

CASE PLANNER: Elizabeth Kellums, Planner III – Historic Preservation

HISTORIC PRESERVATION COMMISSION HEARING DATE: November 7, 2022

HISTORIC PRESERVATION COMMISSION FUNCTION:

Review the proposal for compliance with Criteria and Standards for altering designated properties or contributing properties in an historic district in Section 24-1003j of the City of Greeley Municipal Code and approve or deny the request.

PROJECT OVERVIEW AND BACKGROUND:

Proposed Project

On September 20, 2022, Ashley Fusco, representative of property owner 820 LLC, submitted an application for a Certificate of Approval to the Historic Preservation Office for exterior alterations at 827 10th Street. Staff determined the application to be complete on September 27, 2022. The applicant requests approval for the following:

- Remove existing non-historic stucco over the historic brick façade,
- Clean the brick using Prosoco Sure Klean 600 brick cleaner,
- Repoint mortar joints as needed,
- Repaint sign band if needed,
- Remove existing fixed frame awning, and
- Add retractable awning and exterior gooseneck light fixtures.

Please see the Application and Narrative for a Certificate of Approval (Attachment A), Current Photographs (Attachment B), Historic Photograph (Attachment C), Prosoco Sure Klean 600 brick cleaner product information (Attachment D), Existing Site Map (Attachment E), Architectural Inventory Form for 827 10th Street (Attachment F), Preservation Brief #1 Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings (Attachment G), and Preservation Brief #2 Repointing Mortar Joints in Historic Masonry Buildings (Attachment H).

Existing Conditions
This one-story, rectangular early 20th century commercial building has two storefronts and non-historic stucco over historic brick. The roof is flat with a parapet. It has two triangular awnings over the storefronts, including a larger fixed frame awning over the larger west storefront and a smaller one over the east storefront. There is a sign over the east storefront for the Kingsford Law Offices and an empty sign band over the west storefront. The west storefront has a centered entrance with large plate glass windows on either side. The east storefront has a recessed entrance covered with a lower awning.

Obvious alterations completed at an unknown date, prior to the current owner, include installation of the floor to ceiling metal frame storefront windows and the installation of stucco over the brick. The integrity of the building has been compromised but retains historic brick under the stucco.

Background
The property is a contributing building in the Downtown Greeley Historic District and is subject to review by the Historic Preservation Commission for major alterations. The Downtown Design Guidelines for the Downtown Greeley Historic District apply to this property.

SITE DATA:

Legal Description:	GR1864C UNIT A 1864 10ST CONDO, City of Greeley, County of Weld, State of Colorado
Neighborhood:	Downtown Greeley Historic District
Designation:	Contributing property in the Downtown Greeley Historic District
Year Property Built:	ca. 1915 (source: Architectural Inventory Form)
Architectural Style/Type:	Early 20th Century Commercial
Zoning:	Commercial – High Intensity (C-H)
Dates of Significant Renovations:	Certificate of Occupancy Approval for King's Clocks, LLC; 10/26/2006. Sign Permit for wall sign and awning sign for King's Clock's; Establishment: King's Clocks; Applicant: Biltrite Sign Service, Inc.; Permit #06080078 Date: 8/10/2006, Sign Permit Mockup for Weiss Jewelers; Contractor: Smith Sign Studio; 11/4/1993.

Sign Permit for Weiss Jewelers for Vinyl and Steel Canopy, 5'x33'10", backlit; Electrical Contractor: Simmons Electric; Contractor: Greeley Tent and Awning; Permit #8800?8, Date 2/5/1988.

Approved variance application for bull-nose backlit awning with 20 square feet of signage for Weiss Jewelers; Owner and applicant: Howard Weiss; Approved by the Zoning Board of Appeals on 2/4/1988.

Electrical Permit to wire Sign; Owner: Weiss Jewelers; Contractor: Herdman Electric; Permit #740693; Date: 12/10/1974.

Mechanical Permit for Weiss Jewelers; Contractor: Thermal Services Co. Inc.; Owner: Weiss Jewelers; Permit # 740425; Date: 11/20/1974.

Sign Permit for Weiss Jewelers for letters, 18" x 22' area; Owner: Weiss Jewelers; Electrical Contractor: Herdman Electric; Contractor: Greeley Neon Sign Company.

Building permit for interior remodel, including partition walls; Owner: Weiss Jewelers; Contractor: Carlos Oroza for Designs for Business; Permit #740579; Date: 10/7/1974; Final Inspection: 7/8/1975.

Plumbing Permit application; Owner: Bob Gilbert; Contractor: Stewart & Kelsey; Permit #740434; Date: 8/29/1974.

Building Permit for 8' high frame wall; Leasee: The Singer Sewing Machine Shop; Contractor: Byron Frantz; Permit #710407; Date: 9/2/71; Final: 9/1/71.

Electrical work at 827 10th Street (remodel commercial – retail store) permit #640776; Date: 10/22/64; inactive but not final on 5/19/66.

Source: Building Permit File for 827 10th Street

KEY ISSUES AND ANALYSIS:
The proposed work is evaluated according to the relevant criteria for alteration of designated properties, defined in Section 24-1003j of the Greeley Municipal Code, as follows in the staff analysis.

Greeley Municipal Code, Section 24-1003j Criteria and Standards

1. Alterations. Criteria and standards for alterations to a designated property or a property in a historic district are as follows:

(a) The effect of the alteration or construction upon the general historical or architectural character of the designated property.

(b) The architectural style, arrangement, texture and materials of existing and proposed construction, and their relationship to other buildings.

(c) The effects of the proposed work in creating, changing or destroying the exterior architectural features and details of the structure upon which the work shall be done.

(d) The compatibility of accessory structures and fences with the main structure on the site and with adjoining structures.

(e) The effect of the proposed work upon the protection, enhancement, perpetuation and use of the landmark or landmark district.

(f) Compliance with the current Secretary of the Interior's Standards for the Rehabilitation of Historic Properties, as defined in 24-1003.m.

(g) If the property is a non-contributing property in a historic district, then alterations will be in accordance with the district designation plan as recommended by the Commission and approved by City Council.

(h) Other requirements for alterations of a designated property or contributing property in a district as are required by the procedures and bylaws established by the Commission.

Secretary of the Interior's Standards for Rehabilitation

(1) A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.

(2) The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.

(3) Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other buildings will not be undertaken.

(4) Changes to a property that have acquired historic significance in their own right will be retained and preserved.

(5) Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.

(6) Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.

(7) Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.

(8) Archaeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

(9) New additions, exterior alterations or related new construction will not destroy historic materials, features and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.

(10) New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Applicable Guidelines from the Downtown Historic District Design Guidelines

Building Materials

Brick is the predominant material used for all building types in downtown Greeley, which is typical of historic western downtowns. Tan brick is more common in Greeley than the typical western red brick. The combination of tan, mixed reddish and red brick of the downtown commercial buildings creates a varied streetscape. The detailing of cornices and ornamentation of building walls is most frequently done in brick relief patterns.

While other civic buildings, both historic and contemporary, use stone for detailing, the basic structures are of brick. The Weld County Courthouse is clad with stone and is unique in its use of this material. Residential buildings are detailed with both stone and wood, but their basic structures are generally of brick. Most agricultural/industrial buildings are constructed of brick, although some metal structures remain in use.

The unit size of historic brick masonry, along with the thickness and detailing of the joint are important characteristics. Contemporary masonry units are larger in size and are laid with thicker joints, which creates a very different appearance.

Some historic architectural details are of metal, such as pressed metal cornices. Window and door openings are frequently detailed with stone heads and sills. Terra cotta is used on several buildings but is not common. Wood is used for storefronts and for windows and doors. Some brick buildings have been painted, and many have been covered with more recent modernizations.

An important aspect of downtown Greeley is the modest character of many of its buildings. More elaborate ornamentation and expensive materials are reserved for buildings of significant purpose.

A. *Preserve original building materials when altering historic buildings.*
B. *Carefully match historic materials when altering historic buildings.*
C. *Using simplified designs and historic construction techniques will help make modern alterations of historic buildings fit the historic character of downtown Greeley.*
D. *Stone, wood, and metal were not common historic building materials in Greeley and should be used sparingly on downtown buildings.*
E. *Except in exceptional cases of deterioration, unpainted masonry should be left unpainted. Sealing the surface with pain, or other sealants, can cause spalling of the masonry face; however, if the surface is already painted, removing the paint may damage the masonry more than repainting. Consulting a preservation expert would be helpful in this situation.*
F. *Wood will generally be inappropriate as the predominant material for downtown buildings and should be limited to storefront framing and windows and doors. An exception to this is detailing of historic residential buildings. Wood should be finished with paint or opaque stain.*
G. *Stucco is generally not an appropriate material for use on downtown buildings; however limited use for certain details may be appropriate on a case by case basis.*

Architectural Details

Downtown Greeley buildings are relatively restrained in detailing. There are some exceptions to this that provide some variation in the pattern of simplicity and include such elements as cornices and second floor windows of commercial buildings and wood detailing of residential buildings. Some existing historic downtown buildings may have once had more elaborate detailing that has been covered by façade alterations.

A. *Carefully preserve historic architectural details in alterations of downtown buildings of any type.*
B. *Simple architectural details will be most appropriate for alterations to most historic downtown Greeley buildings. Save elaborate detailing for alterations to buildings that have a significant location, such as an important corner, or significant use, such as a civic building.*

C. *Consider restoring details that have been covered or removed in earlier alterations when renovating historic buildings. If such alterations have damaged or destroyed historic details, seek historic photographs for documentation to use for restoring them. If there is no photographic evidence, consider recreating the detail in a simple design.*
D. *Some alterations to historic buildings have become historically and/or architecturally significant over time. To determine if this is the case for a specific building, consult the Greeley Historic Preservation Specialist.*

Staff Analysis:
The proposed project complies with the applicable criteria and standards for the following reasons:

The proposed project includes the removal of stucco from the façade over the western storefront, cleaning of the brick and repointing of mortar joints as needed following removal of the stucco, painting of sign band if needed, removal of the existing fixed awning and installation of a retractable awning, and installation of new gooseneck lights. The removal of stucco, repointing of the brick as needed, removal of the awning and installation of a retractable awning and installation of gooseneck lights would have a positive impact on the historical and architectural character and features of the building and district. The stucco on the façade is not historic and the proposal to remove it would increase the integrity of the district and building and ability to convey significance because it would remove non-historic material and expose historic brick. Repointing of the brick should be done in a manner to ensure the new mortar matches the existing mortar as closely as possible in composition, texture and color, to ensure protection and stability of the bricks. The proposed retractable awning and gooseneck lights would add to the historic character of the building and district without adding conjectural features. The historic photo (see Attachment C) shows a retractable awning and gooseneck lights on the building, so adding those features of similar style would contribute to the character and integrity. For these same reasons, the stucco removal and masonry repointing, the gooseneck lights and the retractable awning meet the Greeley Municipal Code Criteria in Section 24-1003(j) a, c, e, f, and h and meet the Secretary of the Interior's Standards, including Standards #2, 3, 4, 5, 6.

The proposed cleaning of the brick would potentially meet the Code standards and guidelines and the Secretary of the Interior's Standards but testing on the brick needs to be done prior to application on the remainder of the facade to ensure that the proposed brick cleaner Prosoco Sure Klean 600 does not damage the brick. Standard #7 allows for chemical cleaners using the gentlest means possible, and the product information for Sure Klean 600 indicates it "dissolves mortar smears and construction dirt quickly, leaving the masonry clean and uniform with no acid burning or streaking." Staff recommends making this portion contingent on the applicant and contractor working with staff to determine if the cleaner will be acceptable. If the determination is made by Staff, the applicant and contractor that it will not work, then the applicant and contractor would work with Staff to find an acceptable solution, with no need to return to the Historic Preservation Commission.

If the brick cleaning does not damage the brick, and the staff, applicant and contractor determine painting is not needed, then painting of the sign band should not be undertaken, as that is not an appropriate brick treatment unless it is already painted, or the brick is significantly damaged. The design guidelines indicate that unpainted masonry should be left unpainted. Staff and the applicant and contractor would work together to assess this situation after the stucco is removed to determine the appropriateness of painting based on the condition of the brick.

In summary, for these reasons, the proposed removal of stucco and installation of a retractable awning and gooseneck lights meet the criteria and standards in Section 24-1003(j) of the Greeley Municipal Code, including the Secretary of the Interior's Standards and the Downtown Greeley Design Guidelines. The proposed cleaning of the brick and painting of the sign band potentially meet the criteria and standards and design guidelines as indicated above.

Section 24-1003(j) (1) Criteria and Standards Addressed: a, c, e, f, and h (Secretary's Standards #2, 3, 4, 5, 6) and the Downtown Design Guidelines for Building Materials and Architectural Details.

PUBLIC NOTICE:
Greeley Municipal Code Section 24-1003(f) specifies public notification requirements for Certificate of Approval applications, specifically posting a sign at the property, readily visible by adjacent property owners and from the public right-of-way, no less than 14 days prior to the public hearing. The applicant posted notice at this property on October 17, 2022. On October 14, 2022, Staff emailed a letter of notification to the applicant with the date, time and location of the public hearing.

STAFF RECOMMENDATION:
Staff recommends approval of the stucco removal, installation of a retractable awning and installation of gooseneck light fixtures. Staff further recommends conditional approval of the brick cleaning and mortar repointing with the applicant working with Staff to test the brick cleaner and determine if it will not damage the brick, as well as ensure the mortar mix for the repointing is compatible with existing mortar. Staff recommends the applicant work with the Staff to determine if painting of the sign band is needed. If determined to be needed, Staff recommends approval of the painting of the sign band.

RECOMMENDED MOTION:
A motion that, based on the application received and the preceding analysis, the Commission finds that the proposed removal of the stucco, cleaning of the brick, installation of a retractable awning, installation of gooseneck light fixtures, and painting of the sign band if needed at the western storefront of Weiss Jewelers Building at 827 10th Street meets (1) Criteria and Standards a, c, e, f, and h of Section 24-1003(j)(1) of the Greeley Municipal Code, and therefore approves the request for a Certificate of Approval, conditional upon the applicant and contractor working with Staff to test the brick cleaner and determining it won't damage the brick. Further, approval is contingent on the Staff, applicant and contractor finding an acceptable solution that does not

damage the brick if the proposed brick cleaner damages the brick, and on all required permits being obtained.

ATTACHMENTS:

Attachment A – Application & Narrative for Certificate of Approval
Attachment B – Current Photographs
Attachment C – Historic Photograph
Attachment D – Prosoco Sure Klean 600 product information
Attachment E – Existing Site Map
Attachment F – Architectural Inventory Form for 827 10th Street
Attachment G – Preservation Brief #1 Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings
Attachment H – Preservation Brief #2 Repointing Mortar Joints in Historic Masonry Buildings

City of Greeley Colorado

City of Greeley Community Development Department, Historic Preservation Office, 1100 10th Street, Greeley, CO 80631 970.350.9222
www.greeleygov.com/hp

APPLICATION FORM FOR CERTIFICATE OF APPROVAL
MAJOR ALTERATIONS

The City of Greeley's Historic Preservation Code, Section 24-1003 of the Municipal Code, requires that no exterior major alteration is permitted of any designated historic property or property within a designated historic district without a Certificate of Approval issued by the Historic Preservation Commission. **Please complete pages 5, 7, and 8 and add additional sheets as necessary.**

PROPERTY OWNER(S)
Name: Ashley Fusco
Address: 1319 15 Ave
80631
Phone: 970.590.5133
Cell phone:
Email: ashleyrstreet@icloud.com

APPLICANT (if different From property owner)
Name: 820 LTD
Address: 820 9 St #B
80631
Phone: 970.590.5133
Cell phone:
Email: ashleyrstreet@icloud.com

HISTORIC PROPERTY
Name: 827 10 St - Weiss Jewelers (former)
Address:
Historic District (if applicable): Downtown
Legal Description: * see attached.

Certification: I certify that the information and exhibits herewith submitted are true and correct to the best of my knowledge.

Applicant (Print): Ashley Fusco Telephone: 970.590.5133
Signature: Ashley Fusco Date: 9/21/22

Property owner's signature required. If applicant is other than property owner, property owner approves of the applicant's proposed project.

Owner (Print): Ashley Fusco Telephone: 970.590.5133
Signature: Ashley Fusco Date: 9/21/22

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MAJOR ALTERATIONS CERTIFICATE OF APPROVAL SUBMITTAL CHECKLIST

Include all pertinent information identified on the following page(s), as well as special information requested by Historic Preservation Staff. Add additional sheets for narrative/information as necessary. Additional copies may be requested by Staff, if required for use by persons or groups providing advisory assistance. Submit this application and all required attachments through the City of Greeley website project module of eTRAKiT:

http://greeleygov.com/services/etrakit

The need for additional documents, as listed below, will be determined in a consultation with Historic Preservation Staff and may include:

ALTERATIONS

N/A **Pre-application Conference (in person or phone) (not required)** _____ **Date**

☑ **Application Form signed by applicant and owner (if different)**

N/A **For projects involving architectural drawings, one set 11"x17" (and larger if requested) scaled project drawing(s), including name, date, project address, north arrow, graphic scale, date of drawings, and name, address & phone of owner and designer (if drawings are needed); or**

☑ **Mock-Up of signs or awnings, as needed**

☑ **Product literature, if applicable, such as for window, roof projects, etc.**

☑ **If the proposal is for replacement of historic material, such as windows or siding, provide estimates from qualified contractors for repair and restoration and for replacement.**

☑ **Digital photos accurately representing existing materials, colors, and textures of each side of the building, site or structure to be affected. Date the photographs. Provide information about the view (such as view looking to the north), name of the photographer and about the subject of the photo.**

☐ **Narrative of the proposed project (please type or print legibly on a separate page) Please include responses to the following:**

a. **What is the proposed project? Include detailed information about materials, design, measurements, location on the building or property.**

see attached

b. **Time constraints on the project/Project urgency?**

see attached

c. **Identify which design guidelines relate to the project. Explain how the proposed project meets the guidelines. Provide justification if the proposed project does not meet the guidelines.**

see attached

Guidelines are available for download on the City's historic preservation website, http://greeleygov.com/services/historic-preservation/documents
General guidelines are relevant for individually designated properties. District guidelines are also available for properties located with Greeley Historic Register designated districts.

Contact the Historic Preservation Office at 970.350.9222 or elizabeth.kellums@greeleygov.com for more information or for assistance.

* LEGAL DESCRIPTION *

Condominium Unit No. A, 1864 10th Street Condominium, according to the Condominium Map of 1864 10th Street Condominium Recorded under Reception NO. 3393819 and as defined by the Condominium Declaration of 1864 10th Street Condominium recorded under Reception No. 3393818 in the real estate records of the Clerk and Recorder of Weld County, Colorado as recorded on June 6, 2006, County of Weld, State of Colorado.

With all appurtenances.

known as No. **827 10th Street Unit A, City of Greeley, State of Colorado, 80631** together with all its appurtenances (Property).

Storefront Rehab @ 827 10 Street

The project being proposed at 827 10 Street for review by Greeley's Historic Preservation Commission consists of the following:

- Removal of existing fixed awning, along with stucco/EIFS & metal lath
- Cleaning of brick and re-grout of existing brick joints
- Painting of exposed sign band (if needed)
- Installation of new retractable awning
- Installation of new gooseneck lights, and under awning LED fixtures

This project has an urgency due to season change. The goal is to have it completed before we start to get more snow and colder temperatures.

This project meets the Historic guidelines as it is re-storing the property back to it's original storefront design with the exception of storefront windows and doors. Those were priced out and are just not within the budget. A series of photos were provided from Greeley History Museum of the Custar Food Store, so this was the basis of design for the restoration.

Restoring the original building material, brick, will be the priority. It appears there are two, maybe three various colors on the building. Small exposures cut in the existing stucco of the building have exposed brick that seems to match that of the building to the West. This will provide a more uniform look to the two spaces. The gooseneck lights to highlight the exposed sign band will also be a period appropriate detail. The new retractable awning will be a period appropriate architectural feature. Though a hand crank awning was originally desired, an awning professional has suggested a motorized option, due to the large width of the storefront.

Released by Sean Jaehn on Apr 29, 2022 **Released**

815 39th St • Evans, CO 80620 • Phone: 970-690-8696

Ashley Fusco
Phone: 970-590-5133

Job Address:
827 10th street
GReeley, CO

Print Date: 9-20-2022

Proposal for 827 10th street

Please send all email inquiries to sean@milehighstucco.com

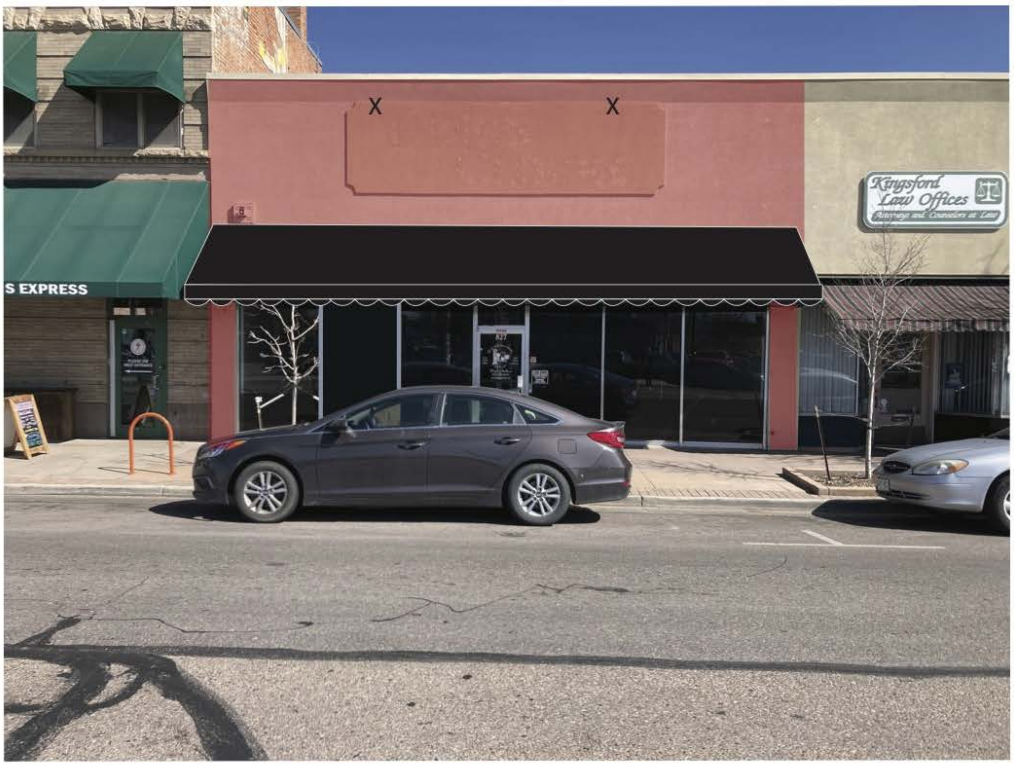
Thank you for the opportunity to bid this project. Please let me know if you have any questions concerning the proposal. If you wish to move forward with the work, please sign this document in order to be added to the schedule.

Items	Description	Qty/Unit	Price
Remove EIFS/Stucco and Lath	Labor and equipment to remove EIFS/Stucco and metal lath from face of building over to adjacent tenants property line and dispose into dumpster by MHS. Removal of awning by others. Through a small investigatory removal it appears that the fasteners are attached in existing mortar joints, however there could be some in brick, causing the brick to spall/crack. A back up plan should be discussed if the brick is not in serviceable condition. Either way, a re-grout of the existing brick joints will be required (see next line item)	500 sqft	$3,500.00
Re-Grout Brick	Grind and re-grout/mortar all brick joints (IF NEEDED OR WANTED). Acid wash brick once cured. Materials and labor	500 sqft	$3,000.00

Total Price: $6,500.00

Payment is due upon completion.
Pricing does not include any site work unless specifically indicated in the narrative above. Price does not include any substrate installation unless specifically indicated in the narrative above. The terms of this bid are submitted in response to and in reliance upon information provided by the contractor. Mile High Stucco reserves the right to reasonably modify (and contractor agrees to accept) terms regarding payment, scope and description of work, and other applicable terms in the event of any requests of the contractor that

From: Ashley Fusco
To: Betsy Kellums
Subject: Re: [EXTERNAL] Project Design Review Application for 827 10 Street
Date: Thursday, September 22, 2022 4:29:16 PM

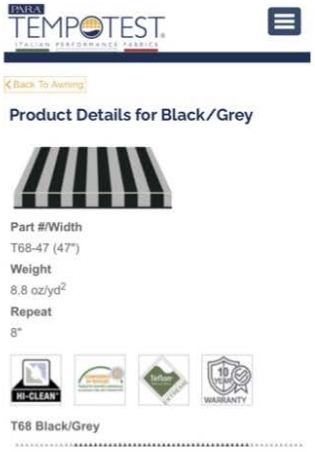


New retractable awning - scalloped edge: 4'2" projection - 32' width

Area where EIFS/Stucco to be removed. Exposing brick

X Proposed gooseneck light fixture - black finish - 16" projection under awning light work to be done - strip LEDs

fabric specs



On Sep 22, 2022, at 4:23 PM, Betsy Kellums <Betsy.Kellums@Greeleygov.com> wrote:

Hi Ashley,

I have not received a document title 827 project drawing. Could you please re-send it? Thank you!

<image001.jpg>
Elizabeth Kellums
Planner III – Historic Preservation
Community Development |Planning
1100 10th Street
Greeley, CO 80631
970-350-9222 | elizabeth.kellums@greeleygov.com
http://greeleygov.com/

From: Ashley Fusco <ashleyrstreet@icloud.com>
Sent: Thursday, September 22, 2022 2:59 PM
To: Betsy Kellums <Betsy.Kellums@Greeleygov.com>
Subject: Re: [EXTERNAL] Project Design Review Application for 827 10 Street

I have reached out to Sean for more info.

As for the details requested in your first paragraph - all that info is on the drawing (file titled 827 Project Drawing)

-Ashley

> On Sep 22, 2022, at 2:50 PM, Betsy Kellums <Betsy.Kellums@Greeleygov.com> wrote:
>
> Hi Ashley,
>
> Thank you! I'll upload them into TRAKiT, but I have a few questions and need more information before I can consider it complete. What will be the dimensions of the awning (width and how far out will it project when fully open? What will be the color and material of the awning? Please indicate on a photo of the building where the gooseneck light fixtures and the under-awning LED fixtures will be installed and the number of them. Please provide product information for your chosen fixture (or something close to it). Why are you planning to paint the sign band? Painting unpainted masonry is not generally an appropriate treatment, although this can be reviewed on a case-by-case basis.
>
> I see on the Mile High Stucco bid, Sean suggested a back up plan if the brick is not in serviceable condition. Please provide narrative describing the back up plan. Also, the re-grout brick portion of the estimate includes an acid wash for the brick once the mortar joints have cured. Please provide more information about that (feel free to have Sean send that information to me if you do not have it).
>
> Because Sean is a member of the Historic Preservation Commission, he will need to recuse himself from this item and won't be able to be in the hearing as your contractor (just a heads up so you can be ready with as much information as possible in the event of questions from the HPC).
>
> Thanks and I look forward to getting the rest of the information from you.
>
> Cheers,
> Betsy
>
> **<image001.jpg>**
> **Elizabeth Kellums**
> Planner III – Historic Preservation
> Community Development |Planning
> 1100 10th Street
> Greeley, CO 80631
> 970-350-9222 | elizabeth.kellums@greeleygov.com
> http://greeleygov.com/
>
> ---
>
> **From:** Ashley Fusco <ashleyrstreet@icloud.com>
> **Sent:** Thursday, September 22, 2022 2:24 PM
> **To:** Betsy Kellums <Betsy.Kellums@Greeleygov.com>
> **Subject:** Re: [EXTERNAL] Project Design Review Application for 827 10 Street
>
> HI -
>
> I went to access the project application and couldn't find it on eTrakit. Hmmm……
>
> I have attached the files you need to complete the request and get me on the October meeting schedule (fingers crossed.)
>
> Ashley Fusco
> <image002.jpg>
>
> > Thanks forgetting back with me, Betsy.
> >
> > I will upload more docs onto the etrakit site. Just waiting for awning specs from Mountain States in Loveland.
> >
> > The Custar Food Store pic is the building, so I attached that as reference to the brick that is underneath existing stucco. I received the pic from Greeley Museums.
> >
> > Attached are two pics of what the brick looks like under the stucco. It looks to match the colors of the corner building (Points West.) They did mesh it, so my stucco guy says that the brick should all be really good condition.
> >
> > I will email you a heads up once I get the upload complete.
> >
> > Thanks, Ashley
> >
> > <Brick Under Stucco_Main Body.jpg><Brick Under Stucco_Lower Portion.jpg>
> >
> > > On Sep 21, 2022, at 8:29 AM, Betsy Kellums <Betsy.Kellums@Greeleygov.com> wrote:
> > >
> > > Hi Ashley,
> > >
> > > Thanks for sending the extra detail. I just need a few more things from you. I did see the photos that you uploaded into eTRAKiT. I'm not sure what the Custar Food Store picture is for? I haven't seen that photo and I'm not it is the same building. Is it to show the example of the awning? Please provide information from the awning company, including the color, material and size of the awning. How far out will it extend? Also, I need more detail about tuckpointing. Do you have an estimate from the contractor doing the stucco removal and tuckpointing? Please also provide product information on the light fixtures with a

mockup of where they will go. Finally, please add to the narrative the answers to if there are time constraints/project urgency for your project and identify which design guidelines apply to the project and how the project meets the guidelines. Please provide justification if the project does not meet the guidelines. I've attached the application form with those questions for your reference (as well as the checklist), and I've also attached the downtown design guidelines.

Once I get a complete application from you, I will be able to give you an idea as to the meeting date. If you get this to me this week, we can look at the October 17th HPC meeting date as the earliest possible date.

Thanks and let me know if you have any questions. I can meet you onsite if that would be helpful to you.

Have a great day!

Cordially,
Betsy

Elizabeth Kellums
Planner III - Historic Preservation
Community Development |Planning
1100 10th Street
Greeley, CO 80631
970-350-9222 | elizabeth.kellums@greeleygov.com
http://greeleygov.com/

-----Original Message-----
From: Ashley Fusco <ashleyrstreet@icloud.com>
Sent: Tuesday, September 20, 2022 12:56 PM
To: Betsy Kellums <Betsy.Kellums@Greeleygov.com>
Subject: [EXTERNAL] Project Design Review Application for 827 10 Street

Hi -

I just did the etrakit application for a major project, but thought I might get you some additional details on the scope of the project:

Remove existing green awning and frame

Remove all the EIFS/stucco on the building - refurbish brick as needed.

Install one new retractable awning (on the lower level - Like in the older pic that was uploaded.)

Install two new gooseneck lights to light up the exposed sign band

Paint newly exposed sign band (if needed)

Please let me know when this project can get on the agenda for review.

Thanks, Betsy.

Ashley Fusco
820 LTD
ashleyrstreet@icloud.com

cell #970-590-5133

_____

<COA application_MAJOR_24-1003_updated 11-2021.pdf><downtown-greeley-design-guidelines.pdf>

MOTORS

By motorizing your Sunair® awning you can extend and retract your awning effortlessly. In fact, motorizing your awning will increase your usage of the product and overall satisfaction. The motors also do not require any maintenance. With a flick of a switch or remote, the awning will extend or retract automatically. A standard wall switch or RTS remote control is available with the optional SOMFY Plug-In motors, eliminating the need for an electrician.

Ondeis Sun
& rain sensor

SOMFY MOTORS feature an integrated radio receiver that allows you to operate the awning by remote. With the optional ONDEIS sun sensor and EOLIS wire free motion/wind sensor the awning automatically extends and retracts with the sun's intensity and exposure to excessive wind.

Standard
Switch

Remote
Control

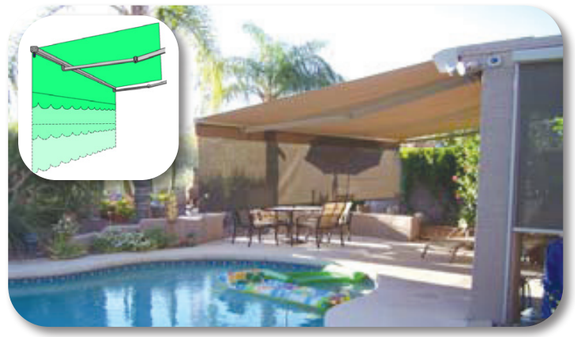
OPTIONS

SUNAIR® XP CROSSOVER ARMS

Sometimes the area on the wall to mount the awning is very narrow, yet a larger projection is desired. The Sunair® XP offers the ability to overlap the arms in order to fit larger projection arms onto a narrow frame. This cross-arm version is available when the desired projection exceeds the width.

VALANCE PLUS

Is an optional roll down drop valance. This valance is great for extra shade on western exposures when the sun is low on the horizon. Acrylic or mesh fabrics are available for the Valance Plus, as well as manual or motorized control.



FRAME COLORS

Ivory
Mocha
Brown
Bronze
White
Black
Gray
Taupe
Green

Frame colors may vary due to the printing process.

CUSTOM COLORS ARE AVAILABLE

SUNPROOFING AMERICA!™

RecScreen 5000P

Serge Ferrari

Call Us for a FREE in-home estimate!

SUNAIR® AWNINGS & SOLAR SCREENS **AUTHORIZED DEALER:**

Mountain States Tent & Awning
2211 West 8th St.
Loveland, CO 80537
970-461-7797
www.mountainstatesta.com

www.SunairAwnings.com

Sunair® Awnings, 7785 Rt. 175 Jessup, MD 20794

Jessup, MD 410.799.1145 Phoenix, AZ

SUNAIR® HAS THE RIGHT RETRACTABLE AWNING SYSTEM FOR YOU!

SUNAIR® AWNINGS & SOLAR SCREENS

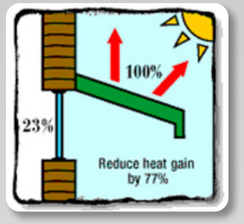
www.SunairAwnings.com

EXPAND YOUR OUTDOOR LIVING SPACE and more...

A Sunair® retractable lateral arm awning is the ideal shading solution for decks and patios. They can be conveniently mounted on the wall, soffit or roof for additional headroom. With a simple hand crank or the convenience of an optional motor, your awning will instantly protect you and your family from the elements. On cloudy days or when not in use, your Sunair® awning is completely self-storing. It eliminates the need for seasonal removal and storage. With over 30 years of experience, SUNAIR® is the innovator in the industry. We have engineered the most durable arm systems, using the strongest materials and the most sophisticated arm design.

ADD VALUE TO YOUR HOME:
A SUNAIR® Lateral Arm Awning offers the ideal solution for creating a comfortable outdoor environment the whole family can enjoy. Imagine staying cool on your deck and protecting your family from the sun's harmful rays. Finally you can enjoy cookouts and entertaining the way it is meant to be with a Sunair® Retractable Awning.

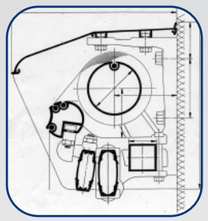
ENERGY SAVINGS:
You can reduce sunlight and glare through your windows by up to 94% and reduce heat gain by as much as 77%. Awnings can reduce cooling energy by as much as 17% in moderate climates. You can also reduce your utility bills.



SUN PROTECTION:
A SUNAIR® awning provides you and your family with 99% UV protection, while also protecting furniture and carpeting from fading. Now you can enjoy the outdoors without worry.

Most Popular Model

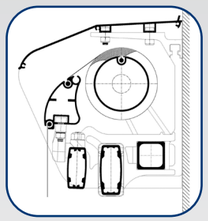
Sunstar®



- Robust lateral arm awning
- Double cable arm design
- Forged elbow, shoulder and arm components
- 7:1 worm gear with stop
- Aluminum support and roller tube
- Motorized or manual
- 8yr year limited frame warranty
- Optional aluminum hood system
- Stainless steel cable standard
- Frame colors: white, mocha, and ivory

Max Size:
24 ft. Wide
11' 6" Projection

Sunair®



- Highest quality lateral arm awning
- Forged elbow, shoulder and arm components
- Double cable arm design components
- 4:1 / 8:1 bevel gear with stop for most efficient operation
- Aluminum support and roller tube
- Motorized or manual
- 15yr year limited frame warranty
- Optional aluminum hood system
- PVC coated Stainless steel cable
- standard

*available in all (9) frame colors and custom RAL Colors as well
(Inquire with Sunair)

Max Size: 35 ft. Wide
14' Projection
(special order wider units)

Suntube®

Highest quality lateral arm awning
Double cable arm design
Forged elbow, shoulder and arm components
4:1 / 8:1 bevel gear with stop for most efficient operation
Aluminum support and roller tube
Motorized or manual
15yr year limited frame warranty
Semi-cassette enclosure
Stainless steel cable standard
*available in all (9) frame colors and custom RAL Colors as well
(Inquire with Sunair)

Max Size:
20 ft. Wide
13' Projection

Here is why the SUNAIR® awning is the best on the market

		SUNAIR® FEATURES	SUNAIR® BENEFITS
ARMS		All arm parts under stress are made of forged aluminum, including the shoulder, elbow, and arm components. All arms 8' 7" and above use three heavy duty steel springs.	Forged aluminum arm components are stronger than all die castings or extrusions, resulting in a stronger awning against the elements. Three heavy duty steel springs provide better arm tension and longer arm life.
FLEXIBILITY		Sunair® uses only the strongest materials, yet is engineered for flexibility with a unique two way movable front arm attachment.	Our unique two way movable front arm attachment relieves strain and increases flexibility and strength in the arm, which reduces wind damage.
ELBOW		The Sunair® uses twin, stainless, high quality aircraft cable. The hinge is triple angled with an elliptical cable radius.	Twin cables are far superior to a single cable, because cable wear is reduced, allowing better arm and fabric tension. The elliptical cable radius increases tension as the awning extends. These angles help keep the fabric from dragging on the arms.
PROFILES & PAINT		All extrusions and components are exclusively made of the highest quality aluminum. The parts are electro statically powder coated.	Aluminum extrusions are strong, yet will not corrode over time like steel. This equates to a longer lasting awning.
GEARS		Manually operated Sunair® units use a heavy duty 4:1 ratio bevel gear with a stop. A 8:1 gear is used on larger widths.	The 4:1 gear is the most efficient gear made. This gear minimizes the time and effort needed in operating a manual awning. The stop eliminates fabric damage due to over rolling.
THREAD		All fabrics are sewn withTenara® thread. This thread is manufactured from GORE-Tex and is clear, making it nearly invisible.	Tenara® thread is made of Teflon and will not deteriorate from exposure to the elements. The clear thread is nearly invisible on most fabric colors.

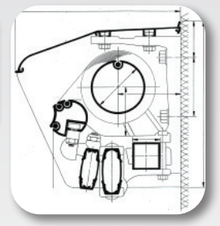
FABRICS

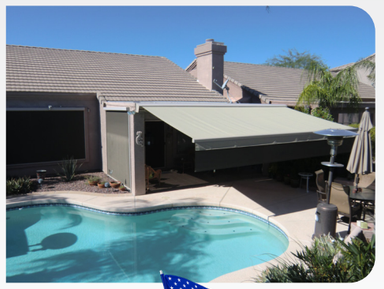
Choose from our exclusive PARA Tempotest® fabric collection. Hundreds of premium grade solid and striped 100% acrylic fabric colors are available to choose from. You will find a fabric to suit your needs and taste. Acrylic fabric is more attractive and breathes better than other fabrics. Acrylic fabric is also resistant to fading and mildew, and has a water repellant Teflon coating. Other fabrics are also available.


Fabric Swatch

TEMPOTEST® PARA ITALIAN PERFORMANCE FABRICS

HOOD OPTIONS


Standard Hood



SUNAIR®
AWNINGS & SOLAR SCREENS

SUNPROOFING AMERICA!™

827 10th Street, fall 2022

Photo of 827 10th Street, provided by applicant Ashley Fusco, September 2022.

Test spot of uncovered brick

Test spot of uncovered brick

ATTACHMENT C

827 10th Street

Courtesy City of Greeley Museums Permanent Collection, 1970.22.0022.33

9 April 1941

PROSOCO®

Sure Klean®

CLEANING & PROTECTIVE TREATMENTS

600

Sure Klean® 600 is an acidic cleaner for brick, tile and concrete surfaces. Sure Klean® 600 dissolves mortar smears and construction dirt quickly, leaving the masonry clean and uniform with no acid burning or streaking.

ADVANTAGES

- **The No. 1-selling proprietary cleaner for new masonry.**
- **Proven effective through years of use.**
- **Recommended by many brick, tile and mortar manufacturers.**
- **Supplied in concentrate for easy on-site dilution.**
- **Safer than muriatic acid for new masonry surfaces.**
- **Removes efflorescence on bricks, new concrete and new stone construction.**
- **Fast and easy to apply – use with cold water rinse.**
- **Special wetting agents let larger masonry surfaces be cleaned at one time, eliminating streaking.**

Limitations

- May not be suitable for cleaning buff-colored brick and brick, stone or tile with manganese or other metallic additives. See product literature on Sure Klean® Vana Trol®.
- Not suitable for cleaning polished or certain glazed surfaces. Always test to ensure suitability.
- Repeated applications may leave a detergent residue. Always prewet to reduce potential for detergent residue. Rinse thoroughly. Do not apply more than twice.
- Not effective for removing atmospheric dirt and black carbon stains. Use the appropriate Sure Klean® restoration cleaner to remove atmospheric staining from older masonry surfaces.
- May damage treated low-E glass; acrylic and polycarbonate sheet glazing; and glazing with surface-applied reflective, metallic or other synthetic coatings and films. Always test for adverse effects prior to overall application. If testing is not feasible or indicates adverse effects, such substrates must be protected.

REGULATORY COMPLIANCE

VOC Compliance

Sure Klean® 600 is compliant with all national, state and district VOC regulations.

TYPICAL TECHNICAL DATA

FORM	Clear, slight amber liquid Pungent odor
SPECIFIC GRAVITY	1.130
pH	0.28 @ 1:4 dilution 0.56 @ 1:12 dilution
WT/GAL	9.4 lbs
ACTIVE CONTENT	not applicable
TOTAL SOLIDS	not applicable
VOC CONTENT	not applicable
FLASH POINT	not applicable
FREEZE POINT	<–22° F (<–30° C)
SHELF LIFE	3 years in tightly sealed, unopened container

SAFETY INFORMATION

Always read full label and SDS for precautionary instructions before use. Use appropriate safety equipment and job site controls during application and handling.

24-Hour Emergency Information:
INFOTRAC at 800-535-5053

PREPARATION

Clean masonry before installing non-masonry materials such as windows, doors, finished flooring, metal fixtures, hardware, light fixtures, roofing materials, etc. that the cleaner could harm. If cleaning is to be completed after installation of non-masonry materials not intended for treatment or exposure to Sure Klean® 600, test all substrates not intended to be treated with Sure Klean® 600 before full scale application. If testing is not feasible or indicates adverse effects, protect substrates from product splash, residue, wind drift and fumes with Sure Klean® Strippable Masking or polyethylene prior to application.

All caulking and sealant materials should be in place and thoroughly cured before cleaning.

When applying to the exteriors of occupied buildings, make sure all windows, exterior intake and air conditioning vents are covered and air handling equipment is shut down during application.

Construction soiling and mortar residues on new brick and tile surfaces clean most effectively if the cleaning is done within 14–28 days of installation. Mortar and grout smears left on the surface longer result in a more difficult clean down and may cause undesirable results. Cleaning high-strength mortar/grout within seven days improves results.

The presence of excessive moisture in the wall contributes to efflorescence and other staining. Always protect open wall cavities from rain during construction.

When working over traffic, clean when traffic is at a minimum. Protect or divert traffic if necessary.

Recommended for these substrates. Always test. Coverage is in sq.ft./m. per gallon of concentrate.

Substrate	*Type*	*Use?*	*Coverage*
Architectural Concrete Block◆	Burnished	no	300–400 sq.ft. 28–37 sq.m.
	Smooth	**yes**	
	Split-faced	**yes**	
	Ribbed	**yes**	
Concrete◆	Brick	**yes**	600–1100 sq.ft. 56–102 sq.m.
	Tile	**yes**	
	Precast Panels	**yes**	
	Pavers	**yes**	
	Cast-in-place	**yes**	
Fired Clay	Brick	**yes**	500–900 sq.ft. 46–84 sq.m.
	Tile	**yes**	
	Terra Cotta (unglazed)	**yes**	
	Pavers	**yes**	
Marble, Travertine, Limestone	Polished	no	N/A
	Unpolished	no	N/A
Granite	Polished	no	N/A
	Unpolished	**yes**	600–1200 sq.ft. 56–111 sq.m.
Sandstone	Unpolished	**yes**	600–900 sq.ft. 56–84 sq.m.
Slate	Unpolished	**yes**	600–1100 sq.ft. 56–102 sq.m.

◆Repeated applications may damage surfaces. Sure Klean® Custom Masonry Cleaner is a more appropriate product.

Always test to ensure desired results. Coverage estimates depend on surface texture and porosity.

Surface and Air Temperatures

For best results, clean when air and masonry surface temperatures are 40° F (4° C) or above. To avoid harming masonry, do not clean when temperatures are below freezing or will be overnight. If freezing conditions existed before application, let the masonry thaw.

Equipment

Apply with low-pressure (50 psi max) spray or densely-packed, soft-fibered masonry-washing brush. Do not atomize. Do not apply with pressure spray over 50 psi. Such application will drive the chemicals deep into the surface, making complete rinse difficult. Test spray equipment for compatibility and to avoid discoloration.

Rinse with enough water and pressure to flush spent cleaner and dissolved soiling from the masonry surface and surface pores without damage. Inadequate rinsing leaves residues which may stain the cleaned surface.

Masonry-washing equipment generating 400–1000 psi with a water flow rate of 6–8 gallons per minute is the best water/pressure combination for rinsing porous masonry. Use a 15–45° fan spray tip. Heated water (150–180° F; 65–82° C) may improve cleaning efficiency. Use adjustable equipment for reducing water flow-rates and rinsing pressure as needed for sensitive surfaces.

Rinsing pressures greater than 1000 psi and fan spray tips smaller than 15° may permanently damage sensitive masonry. Water flow-rates less than 6 gallons per minute may reduce cleaning productivity and contribute to uneven cleaning results.

Storage and Handling

Transport and store in a cool, dry place with adequate ventilation. Always seal container after dispensing. Do not alter or mix with other chemicals. Published shelf life assumes upright storage of factory-sealed container in a dry place. Maintain temperatures of 45–100° F (7–38° C). Do not double stack pallets. Dispose of unused product and container in accordance with local, state and federal regulations.

APPLICATION

Read "Preparation" and the Safety Data Sheet before use.

ALWAYS TEST a small area (minimum 4-ft x 4-ft) of each surface to confirm suitability and desired results before beginning overall application. Test each type of masonry and each type of stain. Test with the same equipment, recommended surface preparation and application procedures planned for general application. Let test area dry 3–7 days before inspection and approval. Make the test panel available for comparison throughout the cleaning project.

If test panel indicates metallic discoloration, or if stains are present before testing, refer to the Metallic Discolorations section on page 4.

Dilution

Dilute Sure Klean® 600 with 4–12 parts clean water to one part concentrate, based on test results. Always pour cold water into empty bucket first, then carefully add product. Never use hot water. Handle in high-density polyethylene or polypropylene containers only. No metal. Acidic materials and fumes attack metal.

Typical Coverage Rates

Reference the substrate chart on page 2. The coverage rate chart assumes an average coverage rate of 100 square feet per gallon of prepared cleaner.

When calculating the volume of cleaner required for porous, textured surfaces, assume 50 square feet per gallon of prepared cleaner.

For dense, smooth surfaces, assume up to 150 square feet per gallon of prepared cleaner.

Application Instructions

Test thoroughly before general cleaning. Provide adequate ventilation. *CAUTION*: Multiple applications may lighten the mortar color.

Exterior Surfaces

1. Working from the bottom to the top, thoroughly prewet a large area with fresh water.
2. Apply the diluted solution freely from the bottom of the work area to the top.
3. Let cleaning solution stay on the wall for 3 to 5 minutes. Do not let cleaner dry into the masonry. This may leave residue or stains. Fresh water rinse the surfaces below areas being cleaned to prevent streaking.
4. Reapply cleaner and scrape off heavy buildup of excess mortar using a wooden scraper or piece of brick. Take care not to harm the masonry surface.
5. Working from the bottom of the work area to the top, rinse thoroughly with clean water, removing all cleaning compound, free sand, loose material and debris.
6. Reapply as needed following steps 1–5.

BEST PRACTICES

Construction soiling and mortar residues on new brick and tile surfaces clean most effectively if the cleaning is done within 14–28 days of installation. Mortar and grout smears left on the surface longer result in a more difficult clean down and may cause undesirable results. Cleaning high-strength mortar/grout within seven days improves results.

Presence of excessive moisture in the wall contributes to efflorescence and other staining. Always protect open wall cavities from rain during construction.

Do not apply with pressure spray over 50 psi. Such application will drive the chemicals deep into the surface, making complete rinse difficult.

Always pour cold water into empty bucket first, then carefully add product. Never use hot water.

Test spray equipment for compatibility and to avoid discoloration. Handle in polypropylene buckets or sprayers only. Acidic materials and fumes attack metal.

Rinse with enough water and pressure to flush spent cleaner and dissolved soiling from the masonry surface and surface pores without damage. Inadequate rinsing leaves residues which may stain the cleaned surface.

Never go it alone. For problems or questions, contact your local PROSOCO distributor or field representative. Or call PROSOCO technical Customer Care at 800-255-4255.

Interior Surfaces
Proper ventilation is necessary. Follow exterior application procedures. Use a sponge or soft-fibered brush to rinse thoroughly.

If conditions don't allow enough water for complete rinsing, use a neutralizing rinse following this procedure:

1. Rinse with clean water.
2. Apply neutralizing rinse of 2 ounces baking soda to 1 gallon water.
3. Saturate. Leave solution on surface 3 to 5 minutes.
4. Apply final rinse of clear water.

Cleanup
Clean tools and equipment using fresh water.

Metallic Discolorations
Because of the metallic oxides contained in many colors of brick in use today, green and brown stains can form on the masonry surface. These stains occur when vanadium, manganese or other oxides migrate to the surface of the brick. Where significant levels of metallic oxides are present in the masonry, an improper dilution of Sure Klean® 600 can contribute to staining.

If the brick shows metallic staining before or after testing, follow these additional steps:

- If stains are light to moderate, test using Sure Klean® 600 at a dilution rate of 8 parts water to 1 part concentrate. After rinsing, let brick weather 10 to 14 days. Minor stains will often disappear if allowed to weather.
- If results are acceptable, clean using this dilution rate. When cleaning is done, let the wall weather. Spot treat minor stains that have not weathered with Sure Klean® stain removal products.
- If severe stains are apparent before original testing or become a problem at any time during the testing, use Sure Klean® Vana Trol® instead of Sure Klean® 600. Vana Trol® is a cleaning compound formulated specifically to control metallic staining. Follow the procedures outlined in the Vana Trol® product literature. In some cases, Vana Trol® will remove vanadium staining. If test panels do not prove effective, test using Sure Klean® 800 Stain Remover and/or Sure Klean® Ferrous Stain Remover.

WARRANTY
The information and recommendations made are based on our own research and the research of others, and are believed to be accurate. However, no guarantee of their accuracy is made because we cannot cover every possible application of our products, nor anticipate every variation encountered in masonry surfaces, job conditions and methods used. The purchasers shall make their own tests to determine the suitability of such products for a particular purpose.

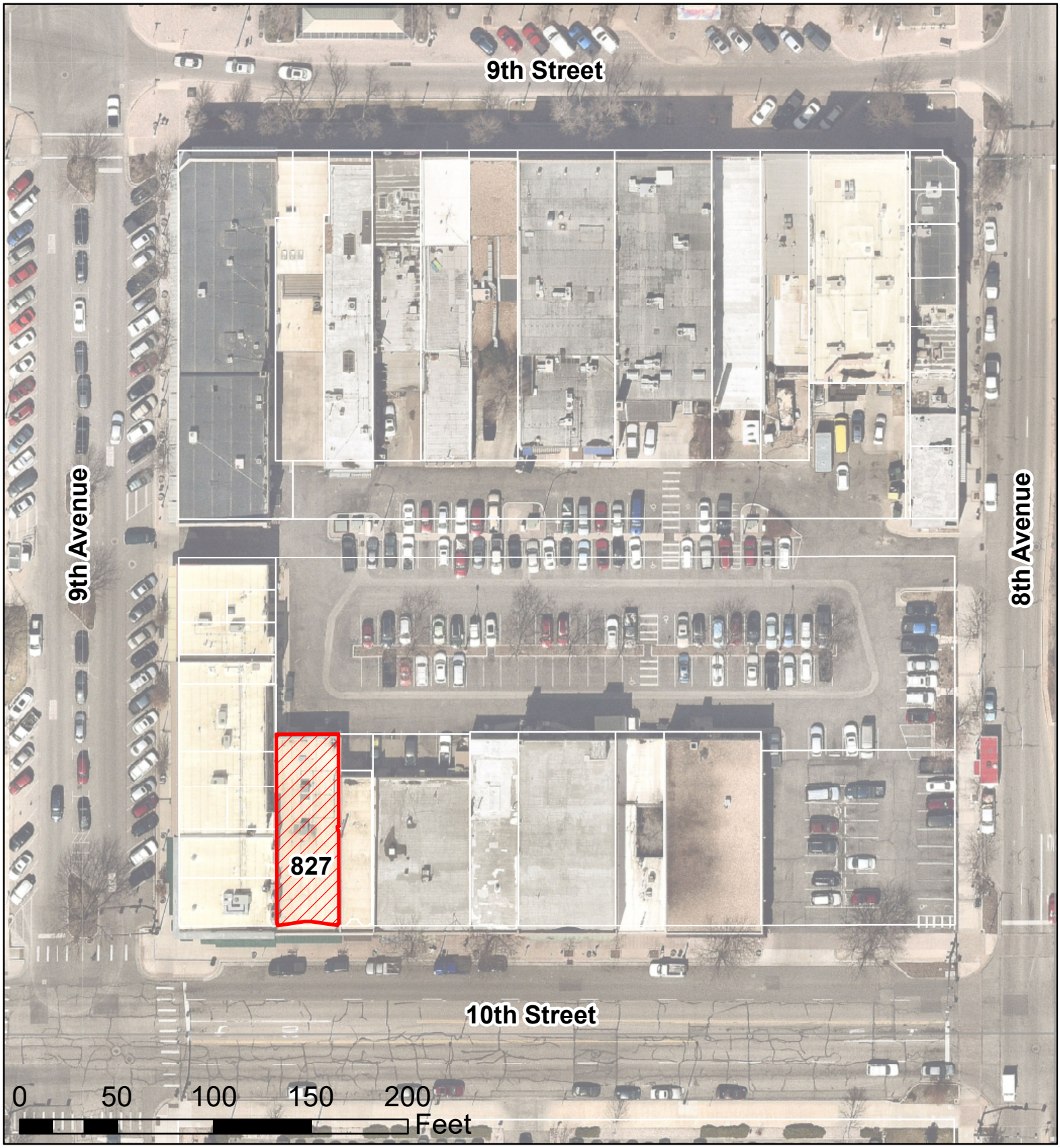
PROSOCO, Inc. warrants this product to be free from defects. **Where permitted by law, PROSOCO makes no other warranties with respect to this product, express or implied, including without limitation the implied warranties of merchantability or fitness for particular purpose**. The purchaser shall be responsible to make his own tests to determine the suitability of this product for his particular purpose. PROSOCO's liability shall be limited in all events to supplying sufficient product to re-treat the specific areas to which defective product has been applied. Acceptance and use of this product absolves PROSOCO from any other liability, from whatever source, including liability for incidental, consequential or resultant damages whether due to breach of warranty, negligence or strict liability. This warranty may not be modified or extended by representatives of PROSOCO, its distributors or dealers.

CUSTOMER CARE
Factory personnel are available for product, environment and job-safety assistance with no obligation. Call 800-255-4255 and ask for Customer Care – technical support.

Factory-trained representatives are established in principal cities throughout the continental United States. Call Customer Care at 800-255-4255, or visit our web site at prosoco.com, for the name of the PROSOCO representative in your area.

827 10th Street
Vicinity Map

ATTACHMENT E



827 10th St.

Greeley Parcels

C-H (Commercial High Density) Zoning

City of Greeley Colorado

COMMUNITY DEVELOPMENT

OAHP 1403
Rev. 9/98

Official Eligibility Determination
(OAHP Use Only)

Date Initials _____

_____ Determined Eligibile-NR
_____ Determined Not Eligible-NR
_____ Determined Eligibile-SR
_____ Determined Not Eligible-SR
_____ Need Data
_____ Contributes to Eligibile NR District
_____ Noncontributing to Eligibile NR District

COLORADO CULTURAL RESOURCE SURVEY

Architectural Inventory Form

I. IDENTIFICATION

1. **Resource Number:** 5WL4168
2. **Temporary Resource Number:** 06
3. **County:** Weld
4. **City:** Greeley
5. **Historic Building Name:** Adams Bakery/Bake Rite Bakery
6. **Current Building Name:** Weiss Jewelers
7. **Building Address:** 827 10TH ST
8. **Owner Name and Address:** WEISS JEWELERS INC , 827 10 ST, GREELEY, CO 80631

Parcel Number: 096105328029
SHF Grant Number: 2001-G1-010

II. GEOGRAPHIC INFORMATION

9. **P.M.** 6th **Township** 5N **Range** 65W
1/4 **1/4** SE **1/4** SW **1/4** **of Section** 5
10. **UTM Reference**
Zone 13 **Easting** 526157 **Northing** 4474524
11. **USGS Quad Name:** Greeley, Colo.
Year: 1950, PR1980 **Map Scale:** 7.5' Attach photo copy of appropriate map section.
12. **Lot (s):** 18 (S99') **Block(s):** 64
Addition: Greeley Original Townsite **Year of Addition:** 1870
13. **Boundary Description and Justification:**
Boundary includes the building and the urban parcel on which it is situated.

III. ARCHITECTURAL DESCRIPTION

14. **Building Plan (footprint, shape):** Irregular
15. **Dimensions in Feet: Length** 102 **X Width** 50
16. **Stories:** 1
17. **Primary External Wall Material(s) (enter no more than two):**
Stucco Brick
18. **Roof Configuration (enter no more than one):**
Flat Roof
19. **Primary External Roof Material (enter no more than one):** Asphalt
20. **Special Features (enter all that apply):**

21. **General Architectural Description:**

One-story, rectangular commercial building divided into two storefronts. Flat roof with metal coping. Upper wall clad with smooth stucco; name of business in this area above west storefront. Arched awning shelters west storefront, which has center entrance with metal frame glazed door and transom. Large metal frame plate glass display windows flanking entrance. Storefront to east has center inset entrance with door with large rectangular light and transom. Fabric awning above entrance. Metal frame plate glass display windows; windows are angled in toward entrance. Black panels below windows. Rear wall of building is brick and is inset for east component, with center

door surmounted by divided transom and large multi-light window. West component rear wall has wall pier with multi-light double-hung sash windows on either side.

22. **Architectural Style/Building Type:** No Style
23. **Landscaping or Special Setting Features:**
    None
24. **Associated Buildings, Features, or Objects:**
    None

IV. ARCHITECTURAL HISTORY

25. **Date of Construction: Estimate** **Actual** 1915
    Source of Information: Building permits
26. **Architect:** Unknown
    Source of Information:
27. **Builder/Contractor:** Unknown
    Source of Information:
28. **Original Owner:** Washburn and Harris (?)
    Source of Information: Building permit
29. **Construction History (include description and dates of major additions, alterations, or demolitions):**

30. **Original Location:** Yes **Date of Moves:**

V. HISTORICAL ASSOCIATIONS

31. **Original Use(s):** Commerce and Trade/Specialty Store
32. **Intermediate Use(s)**
33. **Current Use(s):** Commerce and Trade/Specialty Store
34. **Site Type(s):** Commercial building
35. **Historical Background:**
    A building permit for a one-story brick building to be used as a bakery and candy factory was issued to Washburn and Harris in 1915. The 1930 city directory lists Adams Bakery (825) and an unidentified shop (827) at this address. Adams Bakery was still operating in 825 in 1935 and had been replaced by Bake Rite Bakery in 1944. Bake Rite continued in business at 825 10th Street through at least 1970. The shop in 827 was not specifically identified in city directories through 1950, but a 1929 photograph in Dugan's Greeley and Weld County shows the building with a sign reading "MacMarr Stores," a grocery. In 1960, Edwards Modern Living, Inc. was occupying 827, while in 1970 the Singer Company was housed in the space. Weiss Jewelers, established by Fred Weiss in 1915 and previously housed in the building next door to the east, is currently operating in this building.
36. **Sources of Information:**
    Greeley City Directories, 1922-1970; Sanborn maps, 1886-1968; Weld County Assessor records; City of Greeley Museums, information on Weiss Jewelers and Building Permits.

VI. SIGNIFICANCE

37. **Local Landmark Designation:** No **Date of Designation:**
    Designating Authority:
38. **Applicable National Register Criteria:**

A. Associated with events that have made a significant contribution to the broad pattern of our history;

B. Associated with the lives of persons significant in our past;

C. Embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or that possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction; or

D. Has yielded, or may be likely to yield, information important to history or prehistory.

Qualifies under Criteria Considerations A through G (See Manual).

X Does not meet any of the above National Register criteria.

39. Area(s) of Significance:

40. Period of Significance:

41. Level of Significance:

42. Statement of Significance:

This building is associated with the commercial development of downtown Greeley in the 1920s and housed businesses such as a bakery and grocery store. The façade of the building has been extensively remodeled.

43. Assessment of Historic Physical Integrity Related to Significance:

The building no longer conveys its historic character due to alterations.

VII. NATIONAL REGISTER ELIGIBILITY ASSESSMENT

44. National Register Field Eligibility Assessment: Not Eligible

45. Is there National Register district potential? Discuss. No

Due to a loss of historic integrity through alterations, loss of key buildings, and new construction, there is no cohesive collection of historic buildings which would contribute to a potential historic district.

If there is NRHP district potential, indicate contributing status: N/A

46. If the building is in an existing NRHP district, indicate contributing status: N/A

VIII. RECORDING INFORMATION

47. Photographic Reference(s): 1: 36; 2: 3.

Negatives Filed At: City of Greeley **Photographer:** Roger Whitacre

48. Report Title: Downtown Greeley Historic Buildings Survey, 2001

49. Date(s): April 2001 **50. Recorder(s):** R.L. Simmons/T.H. Simmons

51. Organization: Front Range Research Associates, Inc.

52. Address: 3635 W. 46th Ave., Denver, Colorado 80211 **53. Phone Number(s):** (303) 477-7597

NOTE: Please attach a sketch map, a photocopy of the USGS quad map indicating the resource's location, and photographs.

Downtown Greeley Historic Buildings Survey
Sketch Map

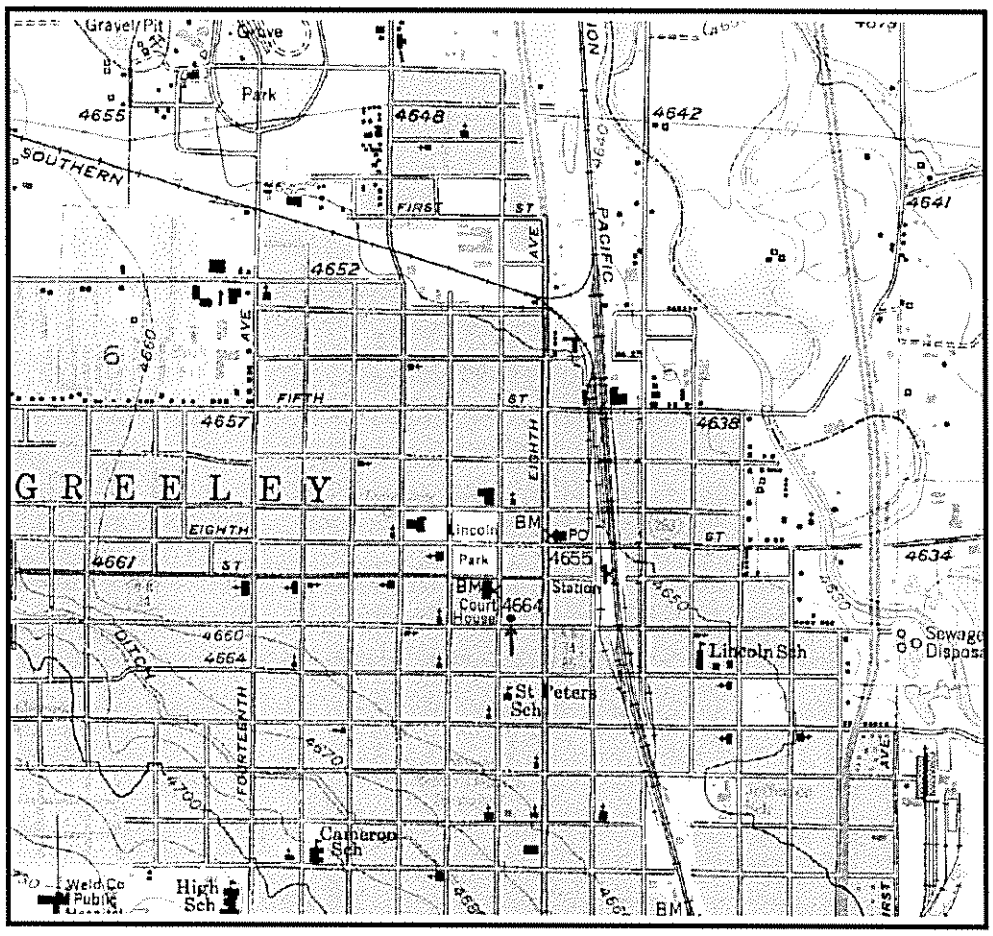
827 10TH ST

20 0 20 40 Feet

Downtown Greeley Historic Buildings Survey
USGS Location Map

Resource Number: 5WL4168
Temporary Number: 06

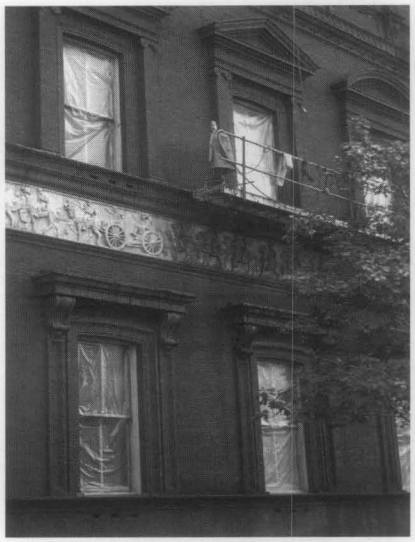
ADDRESS: 827 10TH ST



Extract of U.S. Geological Survey, "Greeley, Colo.," 7.5 minute topographic map (Reston, Virginia: U.S. Geological Survey, 1950, PR1980). Black dot denotes approximate location of resource.


WEISS
JEWELERS
JEWELRY DESIGNERS
EST. 1915
DIAMONDS WATCHES

1 PRESERVATION BRIEFS



Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings

Robert C. Mack, AIA
Anne Grimmer

U.S. Department of the Interior
National Park Service
Cultural Resources

Heritage Preservation Services

Inappropriate cleaning and coating treatments are a major cause of damage to historic masonry buildings. While either or both treatments may be appropriate in some cases, they can be very destructive to historic masonry if they are not selected carefully. Historic masonry, as considered here, includes stone, brick, architectural terra cotta, cast stone, concrete and concrete block. It is frequently cleaned because cleaning is equated with improvement. Cleaning may sometimes be followed by the application of a water-repellent coating. However, unless these procedures are carried out under the guidance and supervision of an architectural conservator, they may result in irrevocable damage to the historic resource.

The purpose of this Brief is to provide information on the variety of cleaning methods and materials that are available for use on the *exterior* of historic masonry buildings, and to provide guidance in selecting the most appropriate method or combination of methods. The difference between water-repellent coatings and waterproof coatings is explained, and the purpose of each, the suitability of their application to historic masonry buildings, and the possible consequences of their inappropriate use are discussed.

The Brief is intended to help develop sensitivity to the qualities of historic masonry that makes it so special, and to assist historic building owners and property managers in working cooperatively with architects, architectural conservators and contractors (Fig. 1). Although specifically intended for historic buildings, the information is applicable to all masonry buildings. This publication updates and expands *Preservation Brief 1: The Cleaning and Waterproof Coating of Masonry Buildings.* The Brief is not meant to be a cleaning manual or a guide for preparing specifications. Rather, it provides general information to raise awareness of the many factors involved in selecting cleaning and water-repellent treatments for historic masonry buildings.

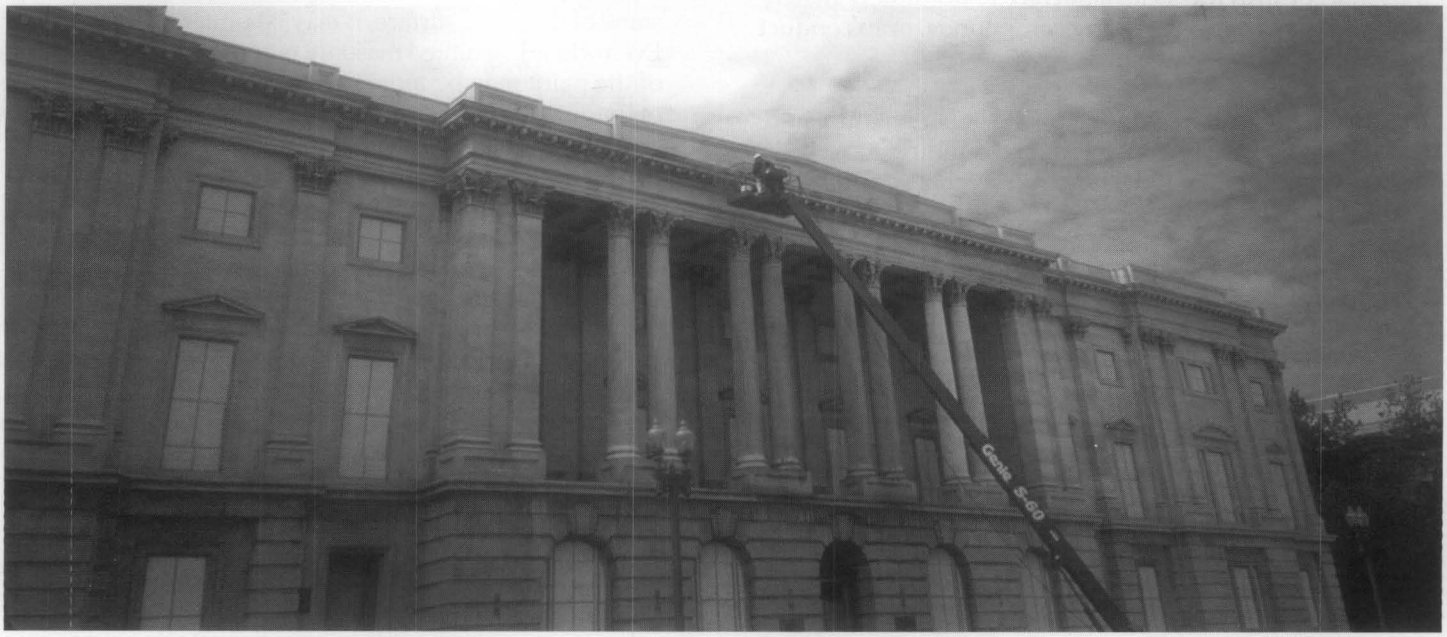


Figure 1. Low-to medium-pressure steam (hot-pressurized water washing), is being used to clean the exterior of the U.S. Tariff Commission Building, the first marble building constructed in Washington, D.C., in 1839. This method was selected by an architecural conservator as the "gentlest means possible" to clean the marble. Steam can soften heavy soiling deposits such as those on the cornice and column capitals, and facilitate easy removal. Note how these deposits have been removed from the right side of the cornice which has already been cleaned.

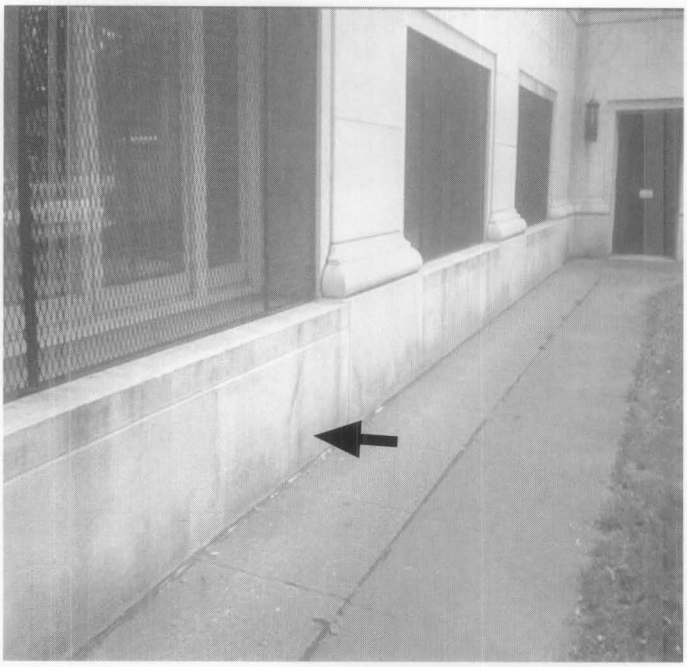


Figure 2. Biological growth as shown on this marble foundation can usually be removed using a low-pressure water wash, possibly with a non-ionic detergent added to it, and scrubbing with a natural or synthetic bristle brush.

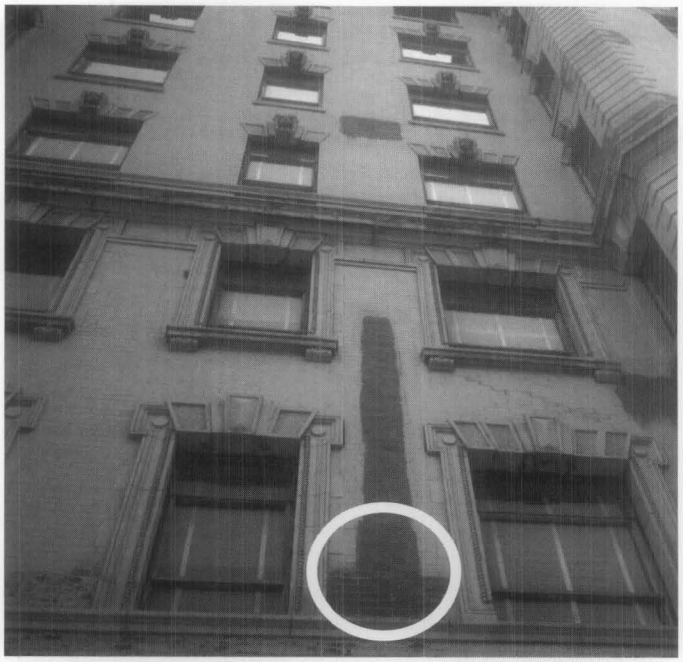


Figure 3. This small test area has revealed a red brick patch that does not match the original beige brick. This may explain why the building was painted, and may suggest to the owner that it may be preferable to keep it painted.

Preparing for a Cleaning Project

Reasons for cleaning. First, it is important to determine whether it is appropriate to clean the masonry. The objective of cleaning a historic masonry building must be considered carefully before arriving at a decision to clean. There are several major reasons for cleaning a historic masonry building: **improve the appearance of the building** by removing unattractive dirt or soiling materials, or non-historic paint from the masonry; **retard deterioration** by removing soiling materials that may be damaging the masonry; or **provide a clean surface** to accurately match repointing mortars or patching compounds, or to conduct a condition survey of the masonry.

Identify what is to be removed. The general nature and source of dirt or soiling material on a building must be identified to remove it in the *gentlest means possible* — that is, in the most effective, yet least harmful, manner. Soot and smoke, for example, require a different cleaning agent to remove than oil stains or metallic stains. Other common cleaning problems include biological growth such as mold or mildew, and organic matter such as the tendrils left on masonry after removal of ivy (Fig. 2).

Consider the historic appearance of the building. If the proposed cleaning is to remove paint, it is important in each case to learn whether or not unpainted masonry is historically appropriate. And, it is necessary to consider why the building was painted (Fig. 3). Was it to cover bad repointing or unmatched repairs? Was the building painted to protect soft brick or to conceal deteriorating stone? Or, was painted masonry simply a fashionable treatment in a particular historic period? Many buildings were painted at the time of construction or shortly thereafter; retention of the paint, therefore, may be more appropriate historically than removing it. And, if the building appears to have been painted for a long time, it is also important to think about whether the paint is part of the character of the historic building and if it has acquired significance over time.

Consider the practicalities of cleaning or paint removal. Some gypsum or sulfate crusts may have become integral with the stone and, if cleaning could result in removing some of the stone surface, it may be preferable not to clean. Even where unpainted masonry is appropriate, the retention of the paint may be more practical than removal in terms of long range preservation of the masonry. In some cases, however, removal of the paint may be desirable. For example, the old paint layers may have built up to such an extent that removal is necessary to ensure a sound surface to which the new paint will adhere.

Study the masonry. Although not always necessary, in some instances it can be beneficial to have the coating or paint type, color, and layering on the masonry researched before attempting its removal. Analysis of the nature of the soiling or of the paint to be removed from the masonry, as well as guidance on the appropriate cleaning method, may be provided by professional consultants, including architectural conservators, conservation scientists and preservation architects. The State Historic Preservation Office (SHPO), local historic district commissions, architectural review boards and preservation-oriented websites may also be able to supply useful information on masonry cleaning techniques.

Understanding the Building Materials

The construction of the building must be considered when developing a cleaning program because inappropriate cleaning can have a deleterious effect on the masonry as well as on other building materials. The masonry material or materials must be correctly identified. It is sometimes difficult to distinguish one type of stone from another; for example, certain sandstones can be easily confused with limestones. Or, what appears to be natural stone may not be stone at all, but cast stone or concrete. Historically, cast stone and architectural terra cotta were frequently used in combination with natural stone, especially for trim elements or on upper stories of a building where, from a distance, these substitute materials looked like real stone (Fig. 4). Other features on historic buildings that appear to be stone, such as decorative cornices, entablatures and window hoods, may not even be masonry, but metal.

Identify prior treatments. Previous treatments of the building and its surroundings should be researched and building maintenance records should be obtained, if available. Sometimes if streaked or spotty areas do not seem to get cleaner following an initial cleaning, closer inspection and analysis may be warranted. The discoloration may turn out not to be dirt but the remnant of a water-repellent coating applied long ago which has darkened the surface of the masonry over time (Fig. 5). Successful removal may require testing several cleaning agents to find something that will dissolve and remove the coating. Complete removal may not always be possible. Repairs may have been stained to match a dirty building, and cleaning may make these differences apparent. De-icing salts used near the building that have dissolved can migrate into the masonry. Cleaning may draw the salts to the surface, where they will appear as efflorescence (a powdery, white substance), which may require a second treatment to be removed. Allowances for dealing with such unknown factors, any of which can be a potential problem, should be included when investigating cleaning methods and materials. Just as more than one kind of masonry on a historic building may necessitate multiple cleaning approaches, unknown conditions that are encountered may also require additional cleaning treatments.

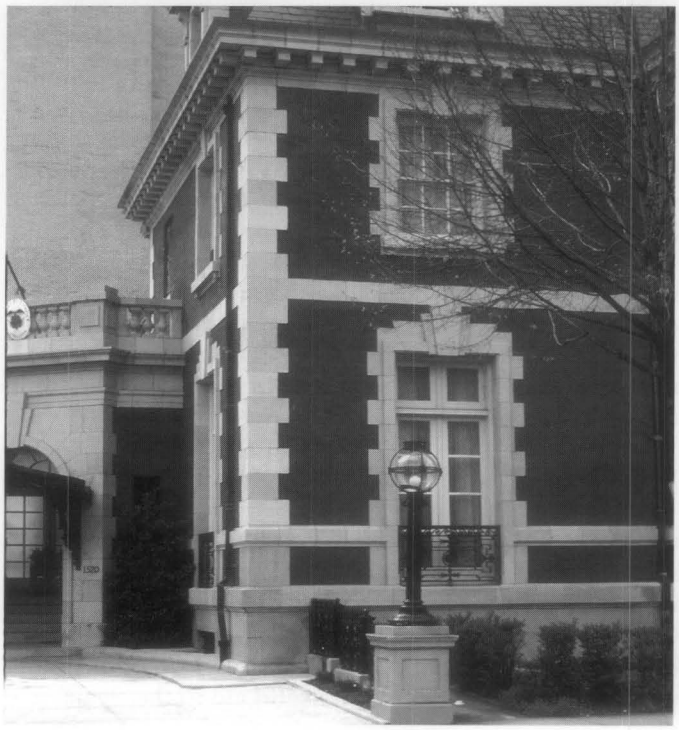


Figure 4. The foundation of this brick building is limestone, but the decorative trim above is architectural terra cotta intended to simulate stone.

Figure 5. Repeated water washing did not remove the staining inside this limestone porte cochere. Upon closer examination, it was determined to be a water-repellent coating that had been applied many years earlier. An alkaline cleaner may be effective in removing it.

Choose the appropriate cleaner. The importance of testing cleaning methods and materials cannot be over emphasized. Applying the wrong cleaning agents to historic masonry can have disastrous results. Acidic cleaners can be extremely damaging to acid-sensitive stones, such as marble and limestone, resulting in etching and dissolution of these stones. Other kinds of masonry can also be damaged by incompatible cleaning agents, or even by cleaning agents that are usually compatible. There are also numerous kinds of sandstone, each with a considerably different geological composition. While an acid-based cleaner may be safely used on some sandstones, others are acid-sensitive and can be severely etched or dissolved by an acid cleaner. Some sandstones contain water-soluble minerals and can be eroded by water cleaning. And, even if the stone type is correctly identified, stones, as well as some bricks, may contain unexpected impurities, such as iron particles, that may react negatively with a particular cleaning agent and result in staining. Thorough understanding of the physical and chemical properties of the masonry will help avoid the inadvertent selection of damaging cleaning agents.

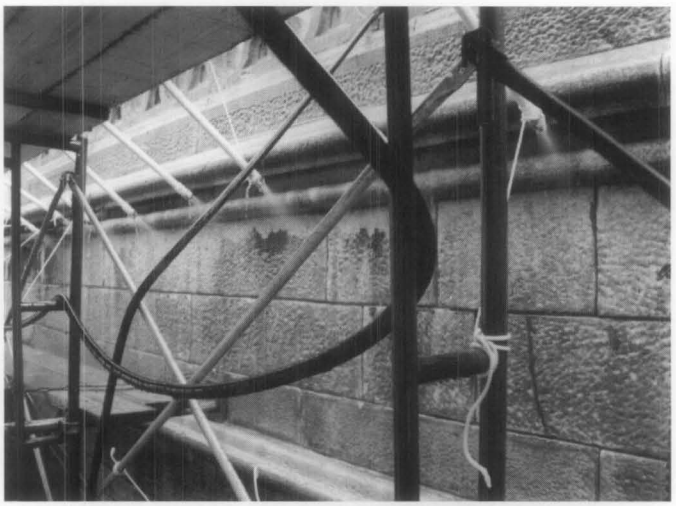


Figure 6. Timed water soaking can be very effective for cleaning limestone and marble as shown here at the Marble Collegiate Church in New York City. In this case, a twelve-hour water soak using a multi-nozzle manifold was followed by a final water rinse. Photo: Diane S. Kaese, Wiss, Janney, Elstner Associates, Inc., N.Y., N.Y.

Other building materials also may be affected by the cleaning process. Some chemicals, for example, may have a corrosive effect on paint or glass. The portions of building elements most vulnerable to deterioration may not be visible, such as embedded ends of iron window bars. Other totally unseen items, such as iron cramps or ties which hold the masonry to the structural frame, also may be subject to corrosion from the use of chemicals or even from plain water. The only way to prevent problems in these cases is to study the building construction in detail and evaluate proposed cleaning methods with this information in mind. However, due to the very likely possibility of encountering unknown factors, any cleaning project involving historic masonry should be viewed as unique to that particular building.

Cleaning Methods and Materials

Masonry cleaning methods generally are divided into three major groups: water, chemical, and abrasive. *Water methods* soften the dirt or soiling material and rinse the deposits from the masonry surface. *Chemical cleaners* react with dirt, soiling material or paint to effect their removal, after which the cleaning effluent is rinsed off the masonry surface with water. *Abrasive methods* include blasting with grit, and the use of grinders and sanding discs, all of which mechanically remove the dirt, soiling material or paint (and, usually, some of the masonry surface). Abrasive cleaning is also often followed with a water rinse. *Laser cleaning*, although not discussed here in detail, is another technique that is used sometimes by conservators to clean small areas of historic masonry. It can be quite effective for cleaning limited areas, but it is expensive and generally not practical for most historic masonry cleaning projects.

Although it may seem contrary to common sense, masonry cleaning projects should be carried out starting at the bottom and proceeding to the top of the building always keeping all surfaces wet below the area being cleaned. The rationale for this approach is based on the principle that dirty water or cleaning effluent dripping from cleaning in progress above will leave streaks on a dirty surface but will not streak a clean surface as long as it is kept wet and rinsed frequently.

Water Cleaning

Water cleaning methods are generally the *gentlest means possible*, and they can be used safely to remove dirt from all types of historic masonry.* There are essentially four kinds of water-based methods: soaking; pressure water washing; water washing supplemented with non-ionic detergent; and steam, or hot-pressurized water cleaning. Once water cleaning has been completed, it is often necessary to follow up with a water rinse to wash off the loosened soiling material from the masonry.

Soaking. Prolonged spraying or misting with water is particularly effective for cleaning limestone and marble. It is also a good method for removing heavy accumulations of soot, sulfate crusts or gypsum crusts that tend to form in protected areas of a building not regularly washed by rain. Water is distributed to lengths of punctured hose or pipe with non-ferrous fittings hung from moveable scaffolding or a swing stage that continuously mists the surface of the masonry with a very fine spray (Fig. 6). A timed on-off spray is another approach to using this cleaning technique. After one area has been cleaned, the apparatus is moved on to another. Soaking is often used in combination with water washing and is also followed by a final water rinse. Soaking is a very slow method — it may take several days or a week—but it is a very gentle method to use on historic masonry.

Water Washing. Washing with low-pressure or medium-pressure water is probably one of the most commonly used methods for removing dirt or other pollutant soiling from historic masonry buildings (Fig. 7). Starting with a very low pressure (100 psi or below), even using a garden hose, and progressing as needed to slightly higher pressure —generally no higher than 300-400 psi—is always the recommended way to begin. Scrubbing with natural bristle or synthetic bristle brushes—never metal which can abrade the surface and leave metal particles that can stain the masonry—can help in cleaning areas of the masonry that are especially dirty.

Water Washing with Detergents. Non-ionic detergents –which are not the same as soaps –are synthetic organic compounds that are especially effective in removing oily soil. (Examples of some of the numerous proprietary non-ionic detergents include Igepal by GAF, Tergitol by Union Carbide and Triton by Rohm & Haas.) Thus, the addition of a non-ionic detergent, or surfactant, to a low- or medium-pressure water wash can be a useful aid in the cleaning

*Water cleaning methods may not be appropriate to use on some badly deteriorated masonry because water may exacerbate the deterioration, or on gypsum or alabaster which are very soluble in water.

process. (A non-ionic detergent, unlike most household detergents, does not leave a solid, visible residue on the masonry.) Adding a non-ionic detergent and scrubbing with a natural bristle or synthetic bristle brush can facilitate cleaning textured or intricately carved masonry. This should be followed with a final water rinse.

Steam/Hot-Pressurized Water Cleaning. Steam cleaning is actually low-pressure hot water washing because the steam condenses almost immediately upon leaving the hose. This is a gentle and effective method for cleaning stone and particularly for acid-sensitive stones. Steam can be especially useful in removing built-up soiling deposits and dried-up plant materials, such as ivy disks and tendrils. It can also be an efficient means of cleaning carved stone details and, because it does not generate a lot of liquid water, it can sometimes be appropriate to use for cleaning interior masonry (Figs. 8-9).

Potential hazards of water cleaning. Despite the fact that water-based methods are generally the most gentle, even they can be damaging to historic masonry. Before beginning a water cleaning project, it is important to make sure that all mortar joints are sound and that the building is watertight. Otherwise water can seep through the walls to the interior, resulting in rusting metal anchors and stained and ruined plaster.

Some water supplies may contain traces of iron and copper which may cause masonry to discolor. Adding a chelating or complexing agent to the water, such as EDTA (ethylene diamine tetra-acetic acid), which inactivates other metallic ions, as well as softens minerals and water hardness, will help prevent staining on light-colored masonry.

Any cleaning method involving water should never be done in cold weather or if there is any likelihood of frost or freezing because water within the masonry can freeze, causing spalling and cracking. Since a masonry wall may take over a week to dry after cleaning, no water cleaning should be permitted for several days prior to the first average frost date, or even earlier if local forecasts predict cold weather.

Most essential of all, it is important to be aware that using water at too high a pressure, a practice common to "power washing" and "water blasting", is very abrasive and can easily etch marble and other soft stones, as well as some types of brick (Figs. 10-11). In addition, the distance of the nozzle from the masonry surface and the type of nozzle, as well as gallons per minute (gpm), are also important variables in a water cleaning process that can have a significant impact on the outcome of the project. This is why it is imperative that the cleaning be closely monitored to ensure that the cleaning operators do not raise the pressure or bring the nozzle too close to the masonry in an effort to "speed up" the process. The appearance of grains of stone or sand in the cleaning effluent on the ground is an indication that the water pressure may be too high.

Figure 7. Glazed architectural terra cotta often may be cleaned successfully with a low-pressure water wash and hand scrubbing supplemented, if necessary, with a non-ionic detergent. Photo: National Park Service Files.

Chemical Cleaning

Chemical cleaners, generally in the form of proprietary products, are another material frequently used to clean historic masonry. They can remove dirt, as well as paint and other coatings, metallic and plant stains, and graffiti. Chemical cleaners used to remove dirt and soiling include **acids**, **alkalies** and **organic compounds.** Acidic cleaners, of course, should not be used on masonry that is acid sensitive. Paint removers are **alkaline**, based on **organic solvents** or other chemicals.

Chemical Cleaners to Remove Dirt

Both alkaline and acidic cleaning treatments include the use of water. Both cleaners are also likely to contain surfactants (wetting agents), that facilitate the chemical reaction that removes the dirt. Generally, the masonry is wet first for both types of cleaners, then the chemical cleaner is sprayed on at very low pressure or brushed onto the surface. The cleaner is left to dwell on the masonry for an amount of time recommended by the product manufacturer or, preferably, determined by testing, and rinsed off with a low- or moderate-pressure cold, or sometimes hot, water wash. More than one application of the cleaner may be necessary, and it is always a good practice to test the product manufacturer's recommendations concerning dilution rates and dwell times. Because each cleaning situation is unique, dilution rates and dwell times can vary considerably. The masonry surface may be scrubbed lightly with natural or synthetic bristle brushes prior to rinsing. After rinsing, pH strips should be applied to the surface to ensure that the masonry has been neutralized completely.

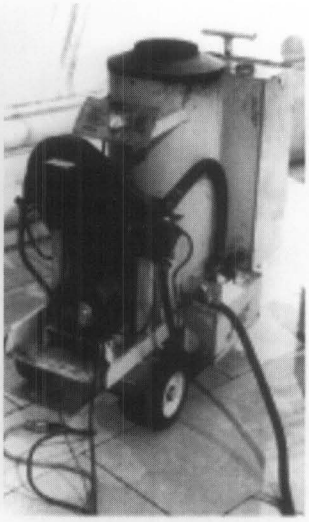


Figure 8. (Left) Low-pressure (under 100 psi) steam cleaning (hot-pressurized water washing), is part of the regular maintenance program at the Jefferson Memorial, Washington, D.C. The white marble interior of this open structure is subject to constant soiling by birds, insects and visitors. (Right) This portable steam cleaner enables prompt cleanup when necessary. Photos: National Park Service Files.

Acidic Cleaners. Acid-based cleaning products may be used on **non-acid sensitive** masonry, which generally includes: granite, most sandstones, slate, unglazed brick and unglazed architectural terra cotta, cast stone and concrete (Fig. 12). Most commercial acidic cleaners are composed primarily of hydrofluoric acid, and often include some phosphoric acid to prevent rust-like stains from developing on the masonry after the cleaning. Acid cleaners are applied to the pre-wet masonry which should be kept wet while the acid is allowed to "work", and then removed with a water wash.

Alkaline Cleaners. Alkaline cleaners should be used on **acid-sensitive** masonry, including: limestone, polished and unpolished marble, calcareous sandstone, glazed brick and glazed architectural terra cotta, and polished granite. (Alkaline cleaners may also be used sometimes on masonry materials that are not acid sensitive—after testing, of course—but they may not be as effective as they are on acid-sensitive masonry.) Alkaline cleaning products consist primarily of two ingredients: a non-ionic detergent or surfactant; and an alkali, such as potassium hydroxide or ammonium hydroxide. Like acidic cleaners, alkaline products are usually applied to pre-wet masonry, allowed to dwell, and then rinsed off with water. (Longer dwell times may be necessary with alkaline cleaners than with acidic cleaners.) Two additional steps are required to remove alkaline cleaners after the initial rinse. First the masonry is given a slightly acidic wash—often with acetic acid–to neutralize it, and then it is rinsed again with water.

Chemical Cleaners to Remove Paint and Other Coatings, Stains and Graffiti

Removing paint and some other coatings, stains and graffiti can best be accomplished with alkaline paint removers, organic solvent paint removers, or other cleaning compounds. The removal of layers of paint from a masonry surface usually involves applying the remover either by brush, roller or spraying, followed by a thorough water wash. As with any chemical cleaning, the manufacturer's recommendations regarding application procedures should always be tested before beginning work.

Alkaline Paint Removers. These are usually of much the same composition as other alkaline cleaners, containing potassium or ammonium hydroxide, or trisodium phosphate. They are used to remove oil, latex and acrylic paints, and are effective for removing multiple layers of paint. Alkaline cleaners may also remove some acrylic, water-repellent coatings. As with other alkaline cleaners, both an acidic neutralizing wash and a final water rinse are generally required following the use of alkaline paint removers.

Organic Solvent Paint Removers. The formulation of organic solvent paint removers varies and may include a combination of solvents, including methylene chloride, methanol, acetone, xylene and toluene.

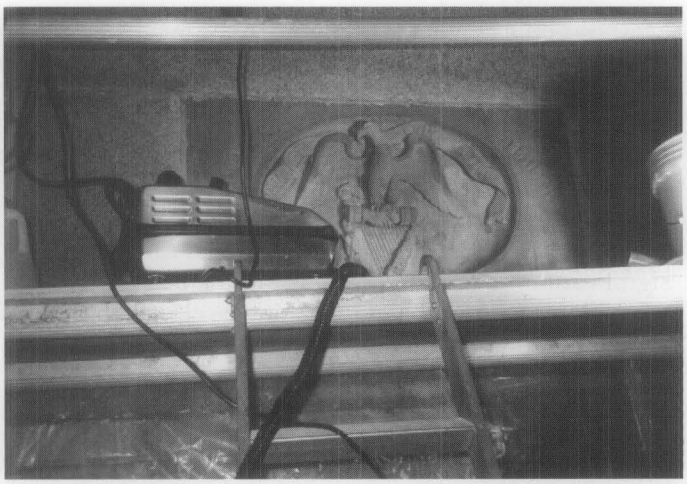


Figure 9. (Left) This small steam cleaner—the size of a vacuum cleaner—offers a very controlled and gentle means of cleaning limited, or hard-to-reach areas or carved stone details. (Right) It is particularly useful for interiors where it is important to keep moisture to a minumum, such as inside the Washington Monument, Washington, D.C., where it was used to clean the commemorative stones. Photos: Audrey T. Tepper.

Figure 10. High-pressure water washing too close to the surface has abraded and, consequently, marred the limestone on this early-20th century building.

Other Paint Removers and Cleaners. Other cleaning compounds that can be used to remove paint and some painted graffiti from historic masonry include paint removers based on N-methyl-2-pyrrolidone (NMP), or on petroleum-based compounds. Removing stains, whether they are industrial (smoke, soot, grease or tar), metallic (iron or copper), or biological (plant and fungal) in origin, depends on carefully matching the type of remover to the type of stain (Fig. 13). Successful removal of stains from historic masonry often requires the application of a number of different removers before the right one is found. The removal of layers of paint from a masonry surface is usually accomplished by applying the remover either by brush, roller or spraying, followed by a thorough water wash (Fig. 14).

Potential hazards of chemical cleaning. Since most chemical cleaning methods involve water, they have many of the potential problems of plain water cleaning. Like water methods, they should not be used in cold weather because of the possibility of freezing. Chemical cleaning should never be undertaken in temperatures below 40 degrees F (4 degrees C), and generally not below 50 degrees F. In addition, many chemical cleaners simply do not work in cold temperatures. Both acidic and alkaline cleaners can be dangerous to cleaning operators and, clearly, there are environmental concerns associated with the use of chemical cleaners.

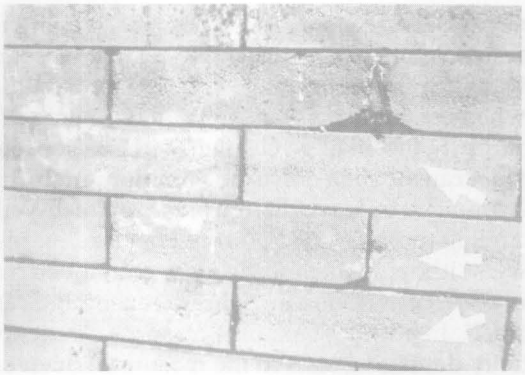


Figure 11. Rinsing with high-pressure water following chemical cleaning has left a horizontal line of abrasion across the bricks on this late-19th century row house.

If not carefully chosen, chemical cleaners can react adversely with many types of masonry. Obviously, acidic cleaners should not be used on acid-sensitive materials; however, it is not always clear exactly what the composition is of any stone or other masonry material. For, this reason, testing the cleaner on an inconspicuous spot on the building is always necessary. While certain acid-based cleaners may be appropriate if used as directed on a particular type of masonry, if left too long or if not adequately rinsed from the masonry they can have a negative effect. For example, hydrofluoric acid can etch masonry leaving a hazy residue (whitish deposits of silica or calcium fluoride salts) on the surface. While this efflorescence may usually be removed by a second cleaning—although it is likely to be expensive and time-consuming—**hydrofluoric acid** can also leave calcium fluoride salts or a colloidal silica deposit on masonry which may be impossible to remove (Fig. 15). Other acids, particularly **hydrochloric (muriatic) acid**, which is very powerful, should not be used on historic masonry, because it can dissolve lime-based mortar, damage brick and some stones, and leave chloride deposits on the masonry.

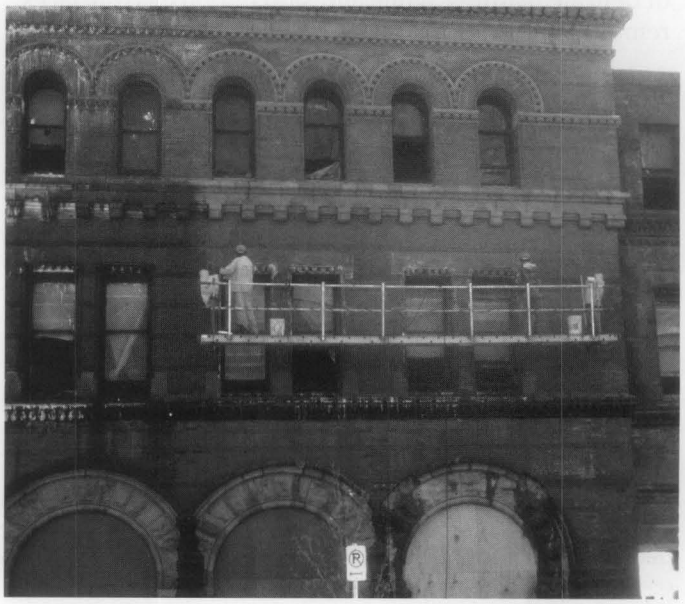


Figure 12. A mild acidic cleaning agent is being used to clean this heavily soiled brick and granite building. Additional applications of the cleaner and hand-scrubbing, and even poulticing, may be necessary to remove the dark stains on the granite arches below. Photo: Sharon C. Park, FAIA.

Alkaline cleaners can stain sandstones that contain a ferrous compound. Before using an alkaline cleaner on sandstone it is always important to test it, since it may be difficult to know whether a particular sandstone may contain a ferrous compound. Some alkaline cleaners, such as **sodium hydroxide (caustic soda or lye)** and **ammonium bifluoride**, can also damage or leave disfiguring brownish-yellow stains and, in most cases, should not be used on historic masonry. Although alkaline cleaners will not etch a masonry surface as acids can, they are caustic and can burn the surface. In addition, alkaline cleaners can deposit potentially damaging salts in the masonry which can be difficult to rinse thoroughly.

Abrasive and Mechanical Cleaning

Generally, abrasive cleaning methods are not appropriate for use on historic masonry buildings. Abrasive cleaning methods are just that—abrasive. Grit blasters, grinders, and sanding discs all operate by *abrading* the dirt or paint off the surface of the masonry, rather than *reacting* with the dirt and the masonry which is how water and chemical methods work. Since the abrasives do not differentiate between the dirt and the masonry, they can also remove the outer surface of the masonry at the same time, and result in permanently damaging the masonry. Brick, architectural terra cotta, soft stone, detailed carvings, and polished surfaces are especially susceptible to physical and aesthetic damage by abrasive methods. Brick and architectural terra cotta are fired products which have a smooth, glazed surface which can be removed by abrasive blasting or grinding (Figs. 18-19). Abrasively-cleaned masonry is damaged aesthetically as well as physically, and it has a rough surface which tends to hold dirt and the roughness will make future cleaning more difficult. Abrasive cleaning processes can also increase the likelihood of subsurface cracking of the masonry. Abrasion of carved details causes a rounding of sharp corners and other loss of delicate features, while abrasion of polished surfaces removes the polished finish of stone.

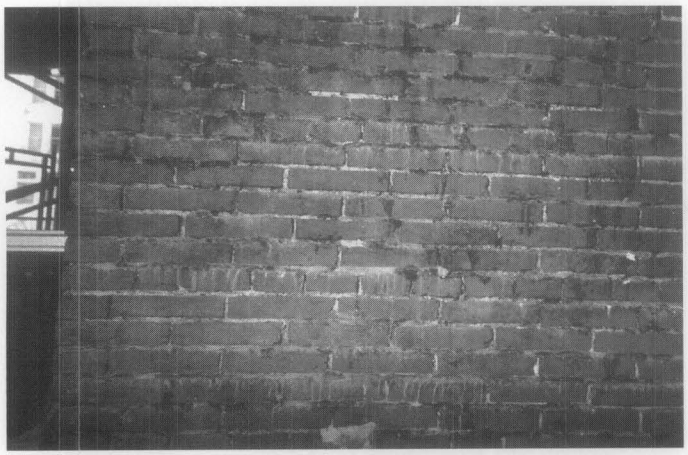


Figure 13. Sometimes it may be preferable to paint over a thick asphaltic coating rather than try to remove it, because it can be difficult to remove completely. However, in this case, many layers of asphaltic coating were removed through multiple applications of a heavy duty chemical cleaner. Each application of the cleaner was left to dwell following the manufacturer's reccommendations, and then rinsed thoroughly. (As much as possible of the asphalt was first removed with wooden scrapers.) Although not all the asphalt was removed, this was determined to be an acceptable level of cleanliness for the project.

Figure 14. Chemical removal of paint from this brick building has revealed that the cornice and window hoods are metal rather than masonry.

Mortar joints, especially those with lime mortar, also can be eroded by abrasive or mechanical cleaning. In some cases, the damage may be visual, such as loss of joint detail or increased joint shadows. As mortar joints constitute a significant portion of the masonry surface (up to 20 per cent in a brick wall), this can result in the loss of a considerable amount of the historic fabric. Erosion of the mortar joints may also permit increased water penetration, which will likely necessitate repointing.

Figure 15. The whitish deposits left on the brick by a chemical paint remover may have resulted from inadequate rinsing or from the chemical being left on the surface too long and may be impossible to remove.

Poulticing to Remove Stains and Graffiti

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b

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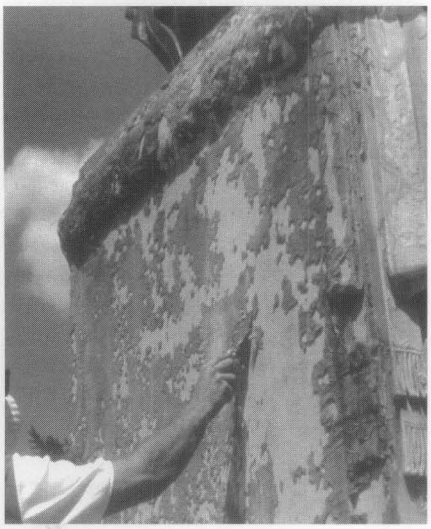

d

Figure 16. (a) The limestone base was heavily stained by runoff from the bronze statue above. (b) A poultice consisting of copper stain remover and ammonia mixed with fuller's earth was applied to the stone base and covered with plastic sheeting to keep it from drying out too quickly. (c) As the poultice dried, it pulled the stain out of the stone. (d) The poultice residue was removed carefully from the stone surface with wooden scrapers and the stone was rinsed with water. Photos: John Dugger.

Graffiti and stains, which have penetrated into the masonry, often are best removed by using a poultice. A poultice consists of an absorbent material or clay powder (such as kaolin or fuller's earth, or even shredded paper or paper towels), mixed with a liquid (solvent or other remover) to form a paste which is applied to the stain (Figs. 16-17). As it dries, the paste absorbs the staining material so that it is not redeposited on the masonry surface. Some commercial cleaning products and paint removers are specially formulated as a paste or gel that will cling to a vertical surface and remain moist for a longer period of time in order to prolong the action of the chemical on the stain. Pre-mixed poultices are also available as a paste or in powder form needing only the addition of the appropriate liquid. The masonry must be pre-wet before applying an alkaline cleaning agent, but not when using a solvent. Once the stain has been removed, the masonry must be rinsed thoroughly.

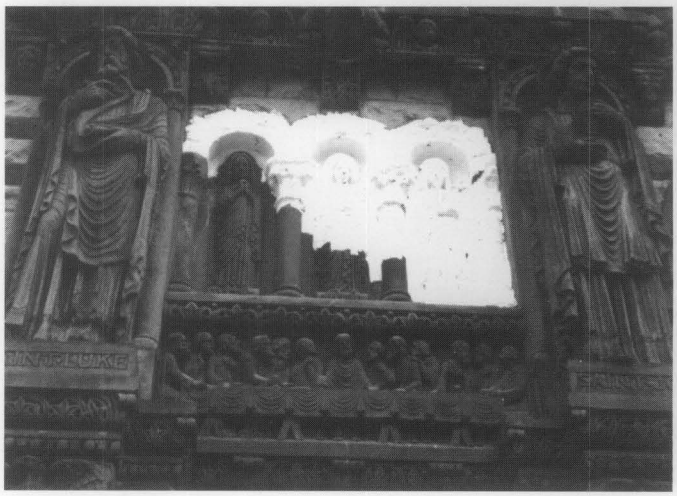

Figure 17. A poultice is being used to remove salts from the brownstone statuary on the facade of this late-19th century stone church. Photo: National Park Service Files.

Figure 18. The glazed bricks in the center of the pier were covered by a signboard that protected them being damaged by the sandblasting which removed the glaze from the surrounding bricks.

Figure 19. A comparison of undamaged bricks surroundng the electrical conduit with the rest of the brick facade emphasizes the severity of the erosion caused by sandblasting.

Abrasive Blasting. Blasting with abrasive grit or another abrasive material is the most frequently used abrasive method. *Sandblasting* is most commonly associated with abrasive cleaning. Finely ground silica or glass powder, glass beads, ground garnet, powdered walnut and other ground nut shells, grain hulls, aluminum oxide, plastic particles and even tiny pieces of sponge, are just a few of the other materials that have also been used for abrasive cleaning. Although abrasive blasting is not an appropriate method of cleaning historic masonry, it can be safely used to clean some materials. Finely-powdered walnut shells are commonly used for cleaning monumental bronze sculpture, and skilled conservators clean delicate museum objects and finely detailed, carved stone features with very small, micro-abrasive units using aluminum oxide.

A number of current approaches to abrasive blasting rely on materials that are not usually thought of as abrasive, and not as commonly associated with traditional abrasive grit cleaning. Some patented abrasive cleaning processes—one dry, one wet —use finely-ground glass powder intended to "erase" or remove dirt and surface soiling only, but not paint or stains (Fig. 20). Cleaning with baking soda (sodium bicarbonate) is another patented process. Baking soda blasting is being used in some communities as a means of quick graffiti removal. However, it should not be used on historic masonry which it can easily abrade and can permanently "etch" the graffiti into the stone; it can also leave potentially damaging salts in the stone which cannot be removed. Most of these abrasive grits may be used either dry or wet, although dry grit tends to be used more frequently.

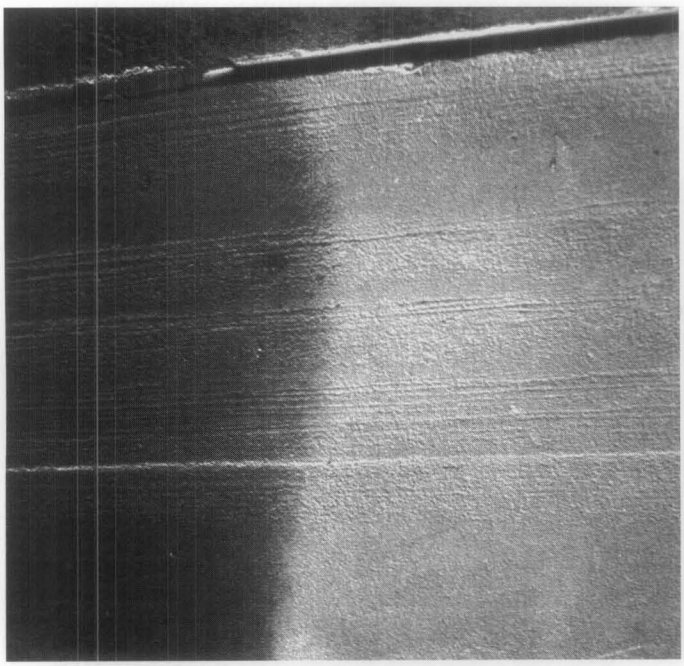

Figure 20. (Left) A comparison of the limestone surface of a 1920s office building before and after "cleaning" with a proprietary abrasive process using fine glass powder clearly shows the effectiveness of this method. But this is an abrasive technique and it has "cleaned" by removing part of the masonry surface with the dirt. Because it is abrasive, it is generally not recommended for large-scale cleaning of historic masonry, although it may be suitable to use in certain, very limited cases under controlled circumstances. (Right) A vacum chamber where the used glass powder is collected for environmentally safe disposal is a unique feature of this particular process. The specially-trained operators in the chamber wear protective clothing, masks and breathing equipment. Photos: Tom Keohan.

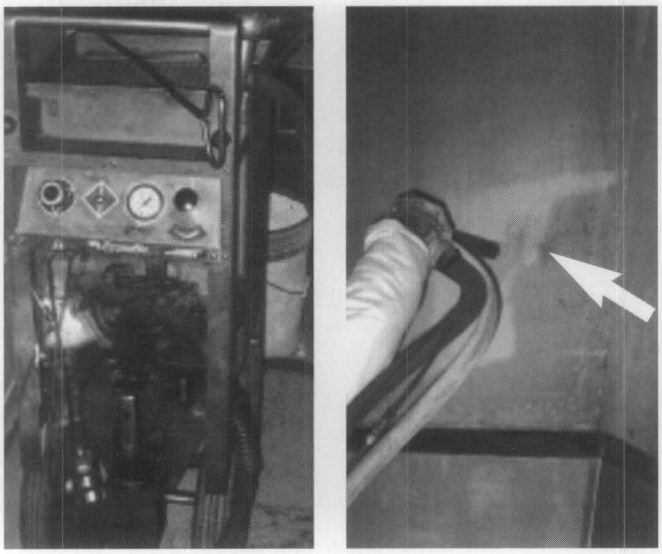

Figure 21. Low-pressure blasting with ice pellets or ice crystals (left) is an abrasive cleaning method that is sometimes recommended for use on interior masonry because it does not involve large amounts of water. However, like other abrasive materials, ice crystals "clean" by removing a portion of the masonry surface with the dirt, and may not remove some stains that have penetrated into the masonry without causing further abrasion (right). Photos: Audrey T. Tepper.

Ice particles, or pelletized dry ice (carbon dioxide or CO_2), are another medium used as an abrasive cleaner (Fig. 21). This is also too abrasive to be used on most historic masonry, but it may have practical application for removing mastics or asphaltic coatings from some substrates.

Some of these processes are promoted as being more environmentally safe and not damaging to historic masonry buildings. However, it must be remembered that they are abrasive and that they "clean" by removing a small portion of the masonry surface, even though it may be only a minuscule portion. The fact that they are essentially abrasive treatments must always be taken into consideration when planning a masonry cleaning project. *In general, abrasive methods should not be used to clean historic masonry buildings.* In some, very limited instances, highly-controlled, gentle abrasive cleaning may be appropriate on selected, hard-to-clean areas of a historic masonry building if carried out under the watchful supervision of a professional conservator. But, abrasive cleaning should never be used on an entire building.

Grinders and Sanding Disks. Grinding the masonry surface with mechanical grinders and sanding disks is another means of abrasive cleaning that should not be used on historic masonry. Like abrasive blasting, grinders and disks do not really clean masonry but instead grind away and abrasively remove and, thus, damage the masonry surface itself rather than remove just the soiling material.

Planning A Cleaning Project

Once the masonry and soiling material or paint have been identified, and the condition of the masonry has been evaluated, planning for the cleaning project can begin.

Testing cleaning methods. In order to determine the *gentlest means possible*, several cleaning methods or materials may have to be tested prior to selecting the best one to use on the building. Testing should always begin with the gentlest and least invasive method proceeding gradually, if necessary, to more complicated methods, or a combination of methods. All too often simple methods, such as low-pressure water wash, are not even considered, yet they frequently are effective, safe, and not expensive. Water of slightly higher pressure or with a non-ionic detergent additive also may be effective. It is worth repeating that these methods should always be tested prior to considering harsher methods; they are safer for the building and the environment, often safer for the applicator, and relatively inexpensive.

The level of cleanliness desired also should be determined prior to selection of a cleaning method. Obviously, the intent of cleaning is to remove most of the dirt, soiling material, stains, paint or other coating. A "brand new" appearance, however, may be inappropriate for an older building, and may require an overly harsh cleaning method to be achieved. When undertaking a cleaning project, it is important to be aware that some stains simply may not be removable. It may be wise, therefore, to agree upon a slightly lower level of cleanliness that will serve as the standard for the cleaning project. The precise amount of residual dirt considered acceptable may depend on the type of masonry, the type of soiling and difficulty of total removal, and local environmental conditions.

Cleaning tests should be carried out in an area of sufficient size to give a true indication of their effectiveness. It is preferable to conduct the test in an inconspicuous location on the building so that it will not be obvious if the test is not successful. A test area may be quite small to begin, sometimes as small as six square inches, and gradually may be increased in size as the most appropriate methods and cleaning agents are determined. Eventually the test area may be expanded to a square yard or more, and it should include several masonry units and mortar joints (Fig. 22). It should be remembered that a single building may have several types of masonry and that even similar materials may have different surface finishes. Each material and different finish should be tested separately. Cleaning tests should be evaluated only after the masonry has dried completely. *The results of the tests may indicate that several methods of cleaning should be used on a single building.*

When feasible, test areas should be allowed to weather for an extended period of time prior to final evaluation. A waiting period of a full year would be ideal in order to expose the test patch to a full range of seasons. If this is not possible, the test patch should weather for at least a month or two. For any building which is considered historically important, the delay is insignificant compared to the potential damage and disfigurement which may result from using an incompletely tested method. *The successfully cleaned test patch should be protected as it will serve as a standard against which the entire cleaning project will be measured.*

Environmental considerations. The potential effect of any method proposed for cleaning historic masonry should be evaluated carefully. Chemical cleaners and paint removers may damage trees, shrubs, grass, and plants. A plan must be provided for environmentally safe removal and disposal of the cleaning materials and the rinsing effluent before beginning the cleaning project. Authorities from the local regulatory agency—usually under the jurisdiction of the federal or state Environmental Protection Agency (EPA) should be consulted prior to beginning a cleaning project, especially if it involves anything more than plain water washing. This advance planning will ensure that the cleaning effluent or run-off, which is the combination of the cleaning agent and the substance removed from the masonry, is handled and disposed of in an environmentally sound and legal manner. Some alkaline and acidic cleaners can be neutralized so that they can be safely discharged into storm sewers. However, most solvent-based cleaners cannot be neutralized and are categorized as pollutants, and must be disposed of by a licensed transport, storage and disposal facility. Thus, it is always advisable to consult with the appropriate agencies before starting to clean to ensure that the project progresses smoothly and is not interrupted by a stop-work order because a required permit was not obtained in advance.

Vinyl guttering or polyethylene-lined troughs placed around the perimeter of the base of the building can serve to catch chemical cleaning waste as it is rinsed off the building. This will reduce the amount of chemicals entering and polluting the soil, and also will keep the cleaning waste contained until it can be removed safely. Some patented cleaning systems have developed special equipment to facilitate the containment and later disposal of cleaning waste.

Concern over the release of volatile organic compounds (VOCs) into the air has resulted in the manufacture of new, more environmentally responsible cleaners and paint removers, while some materials traditionally used in cleaning may no longer be available for these same reasons. Other health and safety concerns have created additional cleaning challenges, such as lead paint removal, which is likely to require special removal and disposal techniques.

Cleaning can also cause damage to non-masonry materials on a building, including glass, metal and wood. Thus, it is usually necessary to cover windows and doors, and other features that may be vulnerable to chemical cleaners. They should be covered with plastic or polyethylene, or a masking agent that is applied as a liquid which dries to form a thin protective film on glass, and is easily peeled off after the cleaning is finished. Wind drift, for example, can also damage other property by carrying cleaning chemicals onto nearby automobiles, resulting in etching of the glass or spotting of the paint finish. Similarly, airborne dust can enter surrounding buildings, and excess water can collect in nearby yards and basements.

Safety considerations. Possible health dangers of each method selected for the cleaning project must be considered before selecting a cleaning method to avoid harm to the

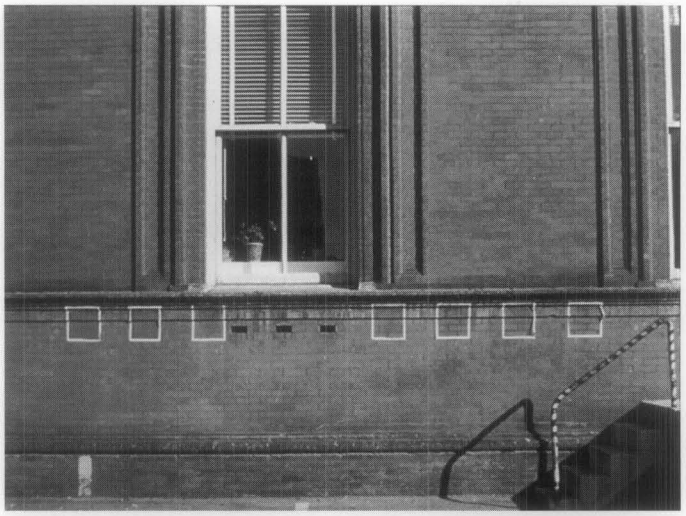

Figure 22. Cleaning test areas may be quite small at first and gradually increase in size as testing determines the "gentlest means possible". Photo: Frances Gale.

cleaning applicators, and the necessary precautions must be taken. The precautions listed in Material Safety Data Sheets (MSDS) that are provided with chemical products should always be followed. Protective clothing, respirators, hearing and face shields, and gloves must be provided to workers to be worn at all times. Acidic and alkaline chemical cleaners in both liquid and vapor forms can also cause serious injury to passers-by (Fig. 23). It may be necessary to schedule cleaning at night or weekends if the building is located in a busy urban area to reduce the potential danger of chemical overspray to pedestrians. Cleaning during non-business hours will allow HVAC systems to be turned off and vents to be covered to prevent dangerous chemical fumes from entering the building which will also ensure the safety of the building's occupants. Abrasive and mechanical methods produce dust which can pose a serious health hazard, particularly if the abrasive or the masonry contains silica.

Water-Repellent Coatings and Waterproof Coatings

To begin with, it is important to understand that waterproof coatings and water-repellent coatings are not the same. Although these terms are frequently interchanged and commonly confused with one another, they are completely different materials. **Water-repellent coatings** —often referred to incorrectly as "sealers", but which do not or should not seal— are intended to keep liquid water from penetrating the surface but to allow water vapor to enter and leave, or pass through, the surface of the masonry (Fig. 24). Water-repellent coatings are generally *transparent*, or clear, although once applied some may darken or discolor certain types of masonry while others may give it a glossy or shiny appearance. **Waterproof coatings** seal the surface from liquid water and from water vapor. They are usually *opaque*, or pigmented, and include bituminous coatings and some elastomeric paints and coatings.

Water-Repellent Coatings

Water-repellent coatings are formulated to be vapor permeable, or "breathable". They do not seal the surface completely to water vapor so it can enter the masonry wall as well as leave the wall. While the first water-repellent coatings to be developed were primarily acrylic or silicone resins in organic solvents, now most water-repellent coatings are water-based and formulated from modified siloxanes, silanes and other alkoxysilanes, or metallic stearates. While some of these products are shipped from the factory ready to use, other waterborne water repellents must be diluted at the job site. Unlike earlier water-repellent coatings which tended to form a "film" on the masonry surface, modern water-repellent coatings actually penetrate into the masonry substrate slightly and, generally, are almost invisible if properly applied to the masonry. They are also more vapor permeable than the old coatings, yet they still reduce the vapor permeability of the masonry. Once inside the wall, water vapor can condense at cold spots producing liquid water which, unlike water vapor, cannot escape through a water-repellent coating. The liquid water within the wall, whether from condensation, leaking gutters, or other sources, can cause considerable damage.

Water-repellent coatings are not consolidants. Although modern water repellents may penetrate slightly beneath the masonry surface, instead of just "sitting" on top of it, they do not perform the same function as a consolidant which is to "consolidate" and replace lost binder to strengthen deteriorating masonry. Even after many years of laboratory study and testing few consolidants have proven very effective. The composition of fired products such as brick and architectural terra cotta, as well as many types of building stone, does not lend itself to consolidation.

Some modern water-repellent coatings which contain a binder intended to replace the natural binders in stone that have been lost through weathering and natural erosion are described in product literature as both a water repellent and a consolidant. The fact that newer water-repellent coatings penetrate beneath the masonry surface instead of just forming a layer on top of the surface may indeed convey at least some consolidating properties to certain stones. However, a water-repellent coating cannot be considered a consolidant. In some instances, a water-repellent or "preservative" coating, if applied to already damaged or spalling stone, may form a surface crust which, if it fails, may exacerbate the deterioration by pulling off even more of the stone (Fig. 25).

Is a Water-Repellent Treatment Necessary?

Water-repellent coatings are frequently applied to historic masonry buildings for the wrong reason. They also are often applied without an understanding of what they are and what they are intended to do. And these coatings can be very difficult, if not impossible, to remove from the masonry if they fail or become discolored. Most importantly, the application of water-repellent coatings to historic masonry is usually unnecessary.

Figure 23. A tarpaulin protects and shields pedestrians from potentially harmful spray while chemical cleaning is underway on the granite exterior of the U.S. Treasury Building, Washington, D.C.

Most historic masonry buildings, unless they are painted, have survived for decades without a water-repellent coating and, thus, probably do not need one now. Water penetration to the interior of a masonry building is seldom due to porous masonry, but results from poor or deferred maintenance. Leaking roofs, clogged or deteriorated gutters and downspouts, missing mortar, or cracks and open joints around door and window openings are almost always the cause of moisture-related problems in a historic masonry building. **If historic masonry buildings are kept watertight and in good repair, water-repellent coatings should not be necessary.**

Rising damp (capillary moisture pulled up from the ground), or condensation can also be a source of excess moisture in masonry buildings. A water-repellent coating will not solve this problem either and, in fact, may be likely to exacerbate it. Furthermore, a water-repellent coating should never be applied to a damp wall. Moisture in the wall would reduce the ability of a coating to adhere to the masonry and to penetrate below the surface. But, if it did adhere, it would hold the moisture inside the masonry because, although a water-repellent coating is permeable to water vapor, liquid water cannot pass through it. In the case of rising damp, a coating may force the moisture to go even higher in the wall because it can slow down evaporation, and thereby retain the moisture in the wall.

Excessive moisture in masonry walls may carry waterborne soluble salts from the masonry units themselves or from the mortar through the walls. If the water is permitted to come to the surface, the salts may appear on the masonry surface as efflorescence (a whitish powder) upon evaporation. However, the salts can be potentially dangerous if they remain in the masonry and crystallize

Figure 24. Although the application of a water-repellent coating was probably not needed on either of these buildings, the coating on the brick building (above), is not visible and has not changed the character of the brick. But the coating on the brick column (below), has a high gloss that is incompatible with the historic character of the masonry.

beneath the surface as subflorescence. Subflorescence eventually may cause the surface of the masonry to spall, particularly if a water-repellent coating has been applied which tends to reduce the flow of moisture out from the subsurface of the masonry. Although many of the newer water-repellent products are more breathable than their predecessors, they can be especially damaging if applied to masonry that contains salts, because they limit the flow of moisture through masonry.

When a Water-Repellent Coating May be Appropriate

There are some instances when a water-repellent coating may be considered appropriate to use on a historic masonry building. Soft, incompletely fired brick from the 18th- and early-19th centuries may have become so porous that paint or some type of coating is needed to protect it from further deterioration or dissolution. When a masonry building has been neglected for a long period of time, necessary repairs may be required in order to make it watertight. If, following a reasonable period of time after the building has been made watertight and has dried out completely, moisture appears actually to be penetrating through the repointed and repaired masonry walls, then the application of a water-repellent coating may be considered *in selected areas only*. This decision should be made in consultation with an architectural conservator. And, if such a treatment is undertaken, it should not be applied to the entire exterior of the building.

Anti-graffiti or barrier coatings are another type of clear coating—although barrier coatings can also be pigmented—that may be applied to exterior masonry, but they are not formulated primarily as water repellents. The purpose of these coatings is to make it harder for graffiti to stick to a masonry surface and, thus, easier to clean. But, like water-repellent coatings, in most cases the application of anti-graffiti coatings is generally not recommended for historic masonry buildings. These coatings are often quite shiny which can greatly alter the appearance of a historic masonry surface, and they are not always effective (Fig. 26). Generally, other ways of discouraging graffiti, such as improved lighting, can be more effective than a coating. However, the application of anti-graffiti coatings may be appropriate in some instances on vulnerable areas of historic masonry buildings which are frequent targets of graffiti that are located in out-of-the-way places where constant surveillance is not possible.

Some water-repellent coatings are recommended by product manufacturers as a means of keeping dirt and pollutants or biological growth from collecting on the surface of masonry buildings and, thus, reducing the need for frequent cleaning. While this at times may be true, in some cases a coating may actually retain dirt more than uncoated masonry. Generally, the application of a water-repellent coating is not recommended on a historic masonry building as a means of preventing biological growth. Some water-repellent coatings may actually encourage biological growth on a masonry wall. Biological growth on masonry buildings has traditionally been kept at bay through regularly-scheduled cleaning as part of a maintenance plan. Simple cleaning of the masonry with low-pressure water using a natural- or synthetic-bristled scrub brush can be very effective if done on a regular basis. Commercial products are also available which can be sprayed on masonry to remove biological growth.

In most instances, a water-repellent coating is not necessary if a building is watertight. The application of a water-repellent coating is not a recommended treatment for historic masonry buildings unless there is a specific

Figure 25. The clear coating applied to this limestone molding has failed and is taking off some of the stone surface as it peels. Photo: Frances Gale.

problem which it may help solve. If the problem occurs on only part of the building, it is best to treat only that area rather than an entire building. Extreme exposures such as parapets, for example, or portions of the building subject to driving rain can be treated more effectively and less expensively than the entire building. Water-repellent coatings are not permanent and must be reapplied periodically although, if they are truly invisible, it can be difficult to know when they are no longer providing the intended protection.

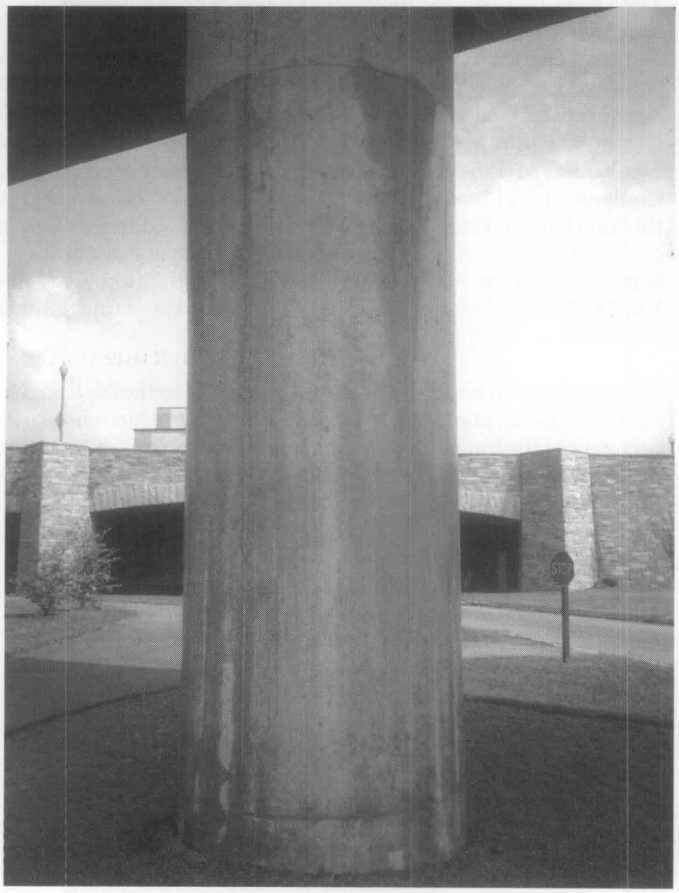

Figure 26. The anti-graffiti or barrier coating on this column is very shiny and would not be appropriate to use on a historic masonry building. The coating has discolored as it has aged and whitish streaks reveal areas of bare concrete where the coating was incompletely applied.

Testing a water-repellent coating by applying it in one small area may not be helpful in determining its suitability for the building because a limited test area does not allow an adequate evaluation of such a treatment. Since water may enter and leave through the surrounding untreated areas, there is no way to tell if the coated test area is "breathable." But trying a coating in a small area may help to determine whether the coating is visible on the surface or if it will otherwise change the appearance of the masonry.

Waterproof Coatings

In theory, waterproof coatings usually do not cause problems as long as they exclude all water from the masonry. If water does enter the wall from the ground or from the inside of a building, the coating can intensify the damage because the water will not be able to escape. During cold weather this water in the wall can freeze causing serious mechanical disruption, such as spalling.

In addition, the water eventually will get out by the path of least resistance. If this path is toward the interior, damage to interior finishes can result; if it is toward the exterior, it can lead to damage to the masonry caused by built-up water pressure (Fig. 27).

In most instances, waterproof coatings should not be applied to historic masonry. The possible exception to this might be the application of a waterproof coating to below-grade exterior foundation walls as a last resort to stop water infiltration on interior basement walls. **Generally, however, waterproof coatings, which include *elastomeric paints*, should almost never be applied above grade to historic masonry buildings.**

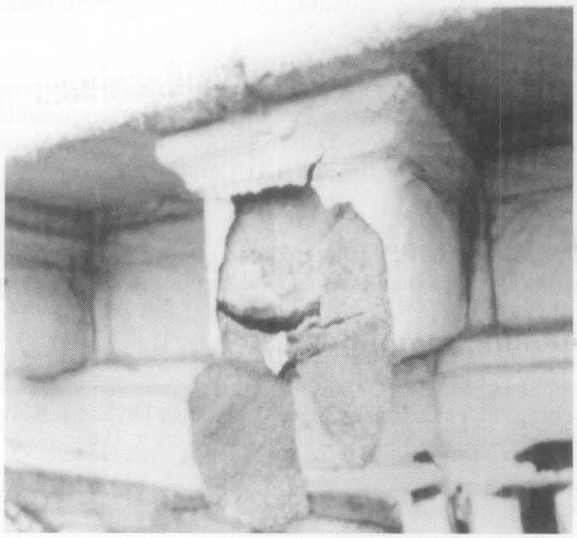

Figure 27. Instead of correcting the roof drainage problems, an elastomeric coating was applied to the already saturated limestone cornice. An elastomeric coating holds moisture in the masonry because it does not "breathe" and does not allow liquid moisture to escape. If the water pressure builds up sufficiently it can cause the coating to break and pop off as shown in this example, often pulling pieces of the masonry with it. Photo: National Park Service Files.

Summary

A well-planned cleaning project is an essential step in preserving, rehabilitating or restoring a historic masonry building. Proper cleaning methods and coating treatments, when determined necessary for the preservation of the masonry, can enhance the aesthetic character as well as the structural stability of a historic building. Removing years of accumulated dirt, pollutant crusts, stains, graffiti or paint, if done with appropriate caution, can extend the life and longevity of the historic resource. Cleaning that is carelessly or insensitively prescribed or carried out by inexperienced workers can have the opposite of the intended effect. It may scar the masonry permanently, and may actually result in hastening deterioration by introducing harmful residual chemicals and salts into the masonry or causing surface loss. Using the wrong cleaning method or using the right method incorrectly, applying the wrong kind of coating or applying a coating that is not needed can result in serious damage, both physically and aesthetically, to a historic masonry building. Cleaning a historic masonry building should always be done using the *gentlest means possible* that will clean, but not damage the building. It should always be taken into consideration before applying a water-repellent coating or a waterproof coating to a historic masonry building whether it is really necessary and whether it is in the best interest of preserving the building.

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Acknowledgments

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This publication has been prepared pursuant to the National Historic Preservation Act of 1966, as amended, which directs the Secretary of the Interior to develop and make available information concerning historic properties. Comments on the usefulness of this publication may be directed to: Sharon C. Park, FAIA, Chief, Technical Preservation Services Branch, Heritage Preservation Services Program, National Park Service, 1849 C Street, N.W., Suite NC200, Washington, D.C. 20240 (www2.cr.nps.gov/tps).

Front Cover: Chemical cleaning of the brick and architectural terra cotta frieze on the 1880s Pension Building, Washington, D.C. (now the National Building Museum), is shown here in progress. Photo: Christina Henry.

Photographs used to illustrate this Brief were taken by Anne Grimmer unless otherwise credited.

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ATTACHMENT H

Some of the web versions of the Preservation Briefs differ somewhat from the printed versions. Many illustrations are new and in color; Captions are simplified and some complex charts are omitted. To order hard copies of the Briefs, see Printed Publications.

PRESERVATION BRIEFS

Repointing Mortar Joints in Historic Masonry Buildings

Robert C. Mack, FAIA, and John P. Speweik

Historical Background
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Soft mortar for repointing. Photo: John P. Speweik.

Masonry—brick, stone, terra-cotta, and concrete block—is found on nearly every historic building. Structures with all-masonry exteriors come to mind immediately, but most other buildings at least have masonry foundations or chimneys. Although generally considered "permanent," masonry is subject to deterioration, especially at the mortar joints. Repointing, also known simply as "pointing"or—somewhat inaccurately—"tuck pointing"*, is the process of removing deteriorated mortar from the joints of a masonry wall and replacing it with new mortar. Properly done, repointing restores the visual and physical integrity of the masonry. Improperly done, repointing not only detracts from the appearance of the building, but may also cause physical damage to the masonry units themselves.

The purpose of this Brief is to provide general guidance on appropriate materials and methods for repointing historic masonry buildings and it is intended to benefit building owners, architects, and contractors. The Brief should serve as a guide to prepare specifications for repointing historic masonry buildings. It should also help develop sensitivity to the particular needs of historic masonry, and to assist historic building owners in working cooperatively with architects, architectural conservators and historic preservation consultants, and contractors. Although specifically intended for historic buildings, the guidance is appropriate for other masonry buildings as well. This publication updates *Preservation Briefs 2: Repointing Mortar Joints in Historic Brick Buildings* to include all types of historic unit masonry. The scope of the earlier Brief has also been expanded to acknowledge that the many buildings constructed in the first half of the 20th century are

now historic and eligible for listing in the National Register of Historic Places, and that they may have been originally constructed with portland cement mortar.

**Tuckpointing technically describes a primarily decorative application of a raised mortar joint or lime putty joint on top of flush mortar joints.*

Historical Background

Mortar consisting primarily of lime and sand has been used as an integral part of masonry structures for thousands of years. Up until about the mid-19th century, lime or quicklime (sometimes called lump lime) was delivered to construction sites, where it had to be slaked, or combined with water. Mixing with water caused it to boil and resulted in a wet lime putty that was left to mature in a pit or wooden box for several weeks, up to a year. Traditional mortar was made from lime putty, or slaked lime, combined with local sand, generally in a ratio of 1 part lime putty to 3 parts sand by volume. Often other ingredients, such as crushed marine shells (another source of lime), brick dust, clay, natural cements, pigments, and even animal hair were also added to mortar, but the basic formulation for lime putty and sand mortar remained unchanged for centuries until the advent of portland cement or its forerunner, Roman cement, a natural, hydraulic cement.

Portland cement was patented in Great Britain in 1824. It was named after the stone from Portland in Dorset which it resembled when hard. This is a fast-curing, hydraulic cement which hardens under water. Portland cement was first manufactured in the United States in 1872, although it was imported before this date. But it was not in common use throughout the country until the early 20th century. Up until the turn of the century portland cement was considered primarily an additive, or "minor ingredient" to help accelerate mortar set time. By the 1930s, however, most masons used a mix of equal parts portland cement and lime putty. Thus, the mortar found in masonry structures built between 1873 and 1930 can range from pure lime and sand mixes to a wide variety of lime, portland cement, and sand combinations.

In the 1930s more new mortar products intended to hasten and simplify masons' work were introduced in the U.S. These included **masonry cement**, a premixed, bagged mortar which is a combination of portland cement and ground limestone, and **hydrated lime**, machine-slaked lime that eliminated the necessity of slaking quicklime into putty at the site.

Identifying the Problem Before Repointing

The decision to repoint is most often related to some obvious sign of deterioration, such as disintegrating mortar, cracks in mortar joints, loose bricks or stones, damp walls, or damaged plasterwork. It is, however, erroneous to assume that repointing alone will solve deficiencies that result from other problems. The root cause of the deterioration—leaking roofs or gutters, differential settlement of the building, capillary action causing rising damp, or extreme weather exposure—should always be dealt with prior to beginning work.

Without appropriate repairs to eliminate the source of the problem, mortar deterioration will continue and any repointing will have been a waste of time and money.

Masons practice using lime putty mortar to repair historic marble. Photo: NPS files.

Use of Consultants

Because there are so many possible causes for deterioration in historic buildings, it may be desirable to retain a consultant, such as a historic architect or architectural conservator, to analyze the building. In addition to determining the most appropriate solutions to the problems, a consultant can prepare specifications which reflect the particular requirements of each job and can provide oversight of the work in progress. Referrals to preservation consultants frequently can be obtained from State Historic Preservation Offices, the American Institute for Conservation of Historic and Artistic Works (AIC), the Association for Preservation Technology (APT), and local chapters of the American Institute of Architects (AIA).

Finding an Appropriate Mortar Match

Preliminary research is necessary to ensure that the proposed repointing work is both physically and visually appropriate to the building. Analysis of unweathered portions of the historic mortar to which the new mortar will be matched can suggest appropriate mixes for the repointing mortar so that it will not damage the building because it is excessively strong or vapor impermeable.

Examination and analysis of the masonry units—brick, stone or terra cotta—and the techniques used in the original construction will assist in maintaining the building's historic appearance. A simple, non- technical, evaluation of the masonry units and

mortar can provide information concerning the relative strength and permeability of each—critical factors in selecting the repointing mortar—while a visual analysis of the historic mortar can provide the information necessary for developing the new mortar mix and application techniques.

This late 19th century granite has recently been repointed with the joint profile and mortar color carefully matched to the original. Photo: NPS files.

Although not crucial to a successful repointing project, for projects involving properties of special historic significance, a mortar analysis by a qualified laboratory can be useful by providing information on the original ingredients. However, there are limitations with such an analysis, and replacement mortar specifications should not be based solely on laboratory analysis. Analysis requires interpretation, and there are important factors which affect the condition and performance of the mortar that cannot be established through laboratory analysis. These may include: the original water content, rate of curing, weather conditions during original construction, the method of mixing and placing the mortar, and the cleanliness and condition of the sand. *The most useful information that can come out of laboratory analysis is the identification of sand by gradation and color.* This allows the color and the texture of the mortar to be matched with some accuracy because sand is the largest ingredient by volume.

In creating a repointing mortar that is compatible with the masonry units, the objective is to achieve one that matches the historic mortar as closely as possible, so that the new material can coexist with the old in a sympathetic, supportive and, if necessary, sacrificial capacity. The exact physical and chemical properties of the historic mortar are not of major significance as long as the new mortar conforms to the following criteria:

- The new mortar must match the historic mortar in **color, texture and tooling.** (If a laboratory analysis is undertaken, it may be possible to match the binder components and their proportions with the historic mortar, if those materials are available.)
- The **sand must match the sand** in the historic mortar. (The color and texture of the new mortar will usually fall into place if the sand is matched successfully.)
- The new mortar must have **greater vapor permeability** and be **softer** (measured in compressive strength) than the masonry units.
- The new mortar must be **as vapor permeable** and **as soft or softer** (measured in compressive strength) than the historic mortar. (Softness or hardness is not necessarily an indication of permeability; old, hard lime mortars can still retain high permeability.)

Mortar Analysis

Methods for analyzing mortars can be divided into two broad categories: **wet chemical** and **instrumental**. Many laboratories that analyze historic mortars use a simple **wet-chemical** method called acid digestion, whereby a sample of the mortar is crushed and then mixed with a dilute acid. The acid dissolves all the carbonate-containing minerals not only in the binder, but also in the aggregate (such as oyster shells, coral sands, or other carbonate-based materials), as well as any other acid-soluble materials. The sand and fine-grained acid-insoluble material is left behind. There are several variations on the simple acid digestion test. One involves collecting the carbon dioxide gas given off as the carbonate is digested by the acid; based on the gas volume the carbnate content of the mortar can be accurately determined (Jedrzejewska, 1960). Simple acid digestion methods are rapid, inexpensive, and easy to perform, but the information they provide about the original composition of a mortar is limited to the color and texture of the sand. The gas collection method provides more information about the binder than a simple acid digestion test.

This mortar is the proper consistency for repointing historic brick. Photo: John P. Speweik.

Instrumental analysis methods that have been used to evaluate mortars include polarized light or thin-section microscopy, scanning electron microscopy, atomic absorption spectroscopy, X-ray diffraction, and differential thermal analysis. All instrumental methods require not only expensive, specialized equipment, but also highly-trained experienced analysts. However, instrumental methods can provide much more information about a mortar. Thin-section microscopy is probably the most commonly used instrumental method. Examination of thin slices of a mortar in transmitted light is often used to supplement acid digestion methods, particularly to look for carbonate-based aggregate. For example, the new ASTM test method, ASTM C 1324-96 "Test Method for Examination and Analysis of Hardened Mortars" which was designed specifically for the analysis of modern lime-cement and masonry cement mortars, combines a complex series of wet chemical analyses with thin-section microscopy.

The drawback of most mortar analysis methods is that mortar samples of known composition have not been analyzed in order to evaluate the method. Historic mortars were not prepared to narrowly defined specifications from materials of

uniform quality; they contain a wide array of locally derived materials combined at the discretion of the mason. While a particular method might be able to accurately determine the original proportions of a lime-cement-sand mortar prepared from modern materials, the usefulness of that method for evaluating historic mortars is questionable unless it has been tested against mortars prepared from materials more commonly used in the past.

Properties of Mortar

Mortars for repointing should be softer or more permeable than the masonry units and no harder or more impermeable than the historic mortar to prevent damage to the masonry units. It is a common error to assume that hardness or high strength is a measure of appropriateness, particularly for lime-based historic mortars. Stresses within a wall caused by expansion, contraction, moisture migration, or settlement must be accommodated in some manner; in a masonry wall, these stresses should be relieved by the mortar rather than by the masonry units. A mortar that is stronger in compressive strength than the masonry units will not "give," thus causing stresses to be relieved through the masonry units—resulting in permanent damage to the masonry, such as cracking and spalling, that cannot be repaired easily.

While stresses can also break the bond between the mortar and the masonry units, permitting water to penetrate the resulting hairline cracks, this is easier to correct in the joint through repointing than if the break occurs in the masonry units.

This early 19th century building is being repointed with lime mortar. Photo: Travis McDonald.

Permeability, or rate of vapor transmission, is also critical. High lime mortars are more permeable than denser cement mortars. Historically, mortar acted as a bedding material—not unlike an expansion joint—rather than a "glue" for the masonry units, and moisture was able to migrate through the mortar joints rather than the masonry units. When moisture evaporates from the masonry it deposits any soluble salts either on the surface as *efflorescence* or below the surface as *subflorescence.* While salts deposited on the surface of masonry units are usually relatively harmless, salt crystallization within a masonry unit creates pressure that can cause parts ofthe outer surface to spall off or delaminate. If the mortar does not permitmoisture or moisture vapor to migrate out of the wall and evaporate, theresult will be damage to the masonry units.

Components of Mortar

Sand

Sand is the largest component of mortar and the material that gives mortar its distinctive color, texture and cohesiveness. Sand must be free of impurities, such as salts or clay. The three key characteristics of sand are: particle shape, gradation and void ratios.

When viewed under a magnifying glass or low-power microscope, particles of sand generally have either rounded edges, such as found in beach and river sand, or sharp, angular edges, found in crushed or manufactured sand. For repointing mortar, rounded or natural sand is preferred for two reasons. It is usually similar to the sand in the historic mortar and provides a better visual match. It also has better working qualities or plasticity and can thus be forced into the joint more easily, forming a good contact with the remaining historic mortar and the surface of the adjacent masonry units. Although manufactured sand is frequently more readily available, it is usually possible to locate a supply of rounded sand.

The gradation of the sand (particle size distribution) plays a very important role in the durability and cohesive properties of a mortar. Mortar must have a certain percentage of large to small particle sizes in order to deliver the optimum performance. Acceptable guidelines on particle size distribution may be found in ASTM C 144 (American Society for Testing and Materials). However, in actuality, since neither historic nor modern sands are always in compliance with ASTM C 144, matching the same particle appearance and gradation usually requires sieving the sand.

A scoop of sand contains many small voids between the individual grains. A mortar that performs well fills all these small voids with binder (cement/lime combination or mix) in a balanced manner. Well-graded sand generally has a 30 per cent void ratio by volume. Thus, 30 per cent binder by volume generally should be used, unless the historic mortar had a different binder: aggregate ratio. This represents the 1:3 binder to sand ratios often seen in mortar specifications.

For repointing, sand generally should conform to ASTM C 144 to assure proper gradation and freedom from impurities; some variation may be necessary to match the original size and gradation. Sand color and texture also should match the original as closely as possible to provide the proper color match without other additives.

Lime

Mortar formulations prior to the late-19th century used lime as the primary binding material. Lime is derived from heating limestone at high temperatures which burns off the carbon dioxide, and turns the limestone into quicklime. There are three

types of limestone—calcium, magnesium, and dolomitic—differentiated by the different levels of magnesium carbonate they contain which impart specific qualities to mortar. Historically, calcium lime was used for mortar rather than the dolomitic lime (calcium magnesium carbonate) most often used today. But it is also important to keep in mind the fact that the historic limes, and other components of mortar, varied a great deal because they were natural, as opposed to modern lime which is manufactured and, therefore, standardized. Because some of the kinds of lime, as well as other components of mortar, that were used historically are no longer readily available, even when a conscious effort is made to replicate a "historic" mix, this may not be achievable due to the differences between modern and historic materials.

Lime, itself, when mixed with water into a paste is very plastic and creamy. It will remain workable and soft indefinitely, if stored in a sealed container. Lime (calcium hydroxide) hardens by carbonation absorbing carbon dioxide primarily from the air, converting itself to calcium carbonate. Once a lime and sand mortar is mixed and placed in a wall, it begins the process of carbonation. If lime mortar is left to dry too rapidly, carbonation of the mortar will be reduced, resulting in poor adhesion and poor durability. In addition, lime mortar is slightly water soluble and thus is able to re-seal any hairline cracks that may develop during the life of the mortar. Lime mortar is soft, porous, and changes little in volume during temperature fluctuations thus making it a good choice for historic buildings. *Because of these qualities, high calcium lime mortar may be considered for many repointing projects, not just those involving historic buildings.*

Caulking was inappropriately used here in place of mortar on the top of the wall. As a result, it has not been durable. Photo: NPS files.

For repointing, lime should conform to ASTM C 207, Type S, or Type SA, Hydrated Lime for Masonry Purposes. This machine-slaked lime is designed to assure high plasticity and water retention. The use of quicklime which must be slaked and soaked by hand may have advantages over hydrated lime in some restoration projects if time and money allow.

Lime Putty

Lime putty is slaked lime that has a putty or paste-like consistency. It should conform to ASTM C 5. Mortar can be mixed using lime putty according to ASTM C 270 property or proportion specification.

Portland Cement

More recent, 20th-century mortar has used portland cement as a primary binding material. A straight portland cement and sand mortar is extremely hard, resists the movement of water, shrinks upon setting, and undergoes relatively large thermal movements. When mixed with water, portland cement forms a harsh, stiff paste that is quite unworkable, becoming hard very quickly. (Unlike lime, portland cement will harden regardless of weather conditions and does not require wetting and drying cycles.) Some portland cement assists the workability and plasticity of the mortar without adversely affecting the finished project; it also provides early strength to the mortar and speeds setting. Thus, it may be appropriate to add some portland cement to an essentially lime-based mortar even when repointing relatively soft 18th or 19th century brick under some circumstances when a slightly harder mortar is required. The more portland cement that is added to a mortar formulation the harder it becomes—and the faster the initial set.

For repointing, portland cement should conform to ASTM C 150. White, non- staining portland cement may provide a better color match for some historic mortars than the more commonly available grey portland cement. But, it should not be assumed, however, that white portland cement is always appropriate for all historic buildings, since the original mortar may have been mixed with grey cement. The cement should not have more than 0.60 per cent alkali to help avoid efflorescence.

Masonry Cement

Masonry cement is a preblended mortar mix commonly found at hardware and home repair stores. It is designed to produce mortars with a compressive strength of 750 psi or higher when mixed with sand and water at the job site. It may contain hydrated lime, but it always contains a large amount of portland cement, as well as ground limestone and other workability agents, including air-entraining agents. Because masonry cements are not required to contain hydrated lime, and generally do not contain lime, they produce high strength mortars that can damage historic masonry. *For this reason, they generally are not recommended for use on historic masonry buildings.*

Lime Mortar (pre-blended)

Hydrated lime mortars, and pre-blended lime putty mortars with or without a matched sand are commercially available. Custom mortars are also available with color. In most instances, pre-blended lime mortars containing sand may not provide an exact match; however, if the project calls for total repointing, a pre-blended lime mortar may be worth considering as long as the mortar is compatible in strength with the masonry. If the project involves only selected, "spot" repointing, then it may be better to carry out a mortar analysis which can provide a custom pre-blended lime mortar with a matching sand.

In either case, if a preblended lime mortar is to be used, it should contain Type S or SA hydrated lime conforming to ASTM C 207.

Water

Water should be potable—clean and free from acids, alkalis, or other dissolved organic materials.

Other Components

Historic components

In addition to the color of the sand, the texture of the mortar is of critical importance in duplicating historic mortar. Most mortars dating from the mid-19th century on—with some exceptions—have a fairly homogeneous texture and color. Some earlier mortars are not as uniformly textured and may contain lumps of partially burned lime or "dirty lime", shell (which often provided a source of lime, particularly in coastal areas), natural cements, pieces of clay, lampblack or other pigments, or even animal hair. The visual characteristics of these mortars can be duplicated through the use of similar materials in the repointing mortar.

Replicating such unique or individual mortars will require writing new specifications for each project. If possible, suggested sources for special materials should be included. For example, crushed oyster shells can be obtained in a variety of sizes from poultry supply dealers.

Pigments

Some historic mortars, particularly in the late 19th century, were tinted to match or contrast with the brick or stone. Red pigments, sometimes in the form of brick dust, as well as brown, and black pigments were commonly used. Modern pigments are available which can be added to the mortar at the job site, but they should not exceed 10 per cent by weight of the portland cement in the mix, and carbon black should be limited to 2 per cent. Only synthetic mineral oxides, which are alkali-proof and sun-fast, should be used to prevent bleaching and fading.

Modern Components

Admixtures are used to create specific characteristics in mortar, and whether they should be used will depend upon the individual project. *Air entraining agents*, for example, help the mortar to resist freeze-thaw damage in northern climates. *Accelerators* are used to reduce mortar freezing prior to setting while *retarders* help to extend the mortar life in hot climates. Selection of admixtures should be made by the architect or architectural conservator as part of the specifications, not something routinely added by the masons.

Generally, modern chemical additives are unnecessary and may, in fact, have detrimental effects in historic masonry projects. The use of antifreeze compounds is not recommended. They are not very effective with high lime mortars and may introduce salts, which may cause efflorescence later. A better practice is to warm the sand and water, and to protect the completed work from freezing. No definitive study has determined whether air-entraining additives should be used to resist frost action and enhance plasticity, but in areas of extreme exposure requiring high-strength mortars with lower permeability, air-entrainment of 10-16 percent may be desirable (see formula for "severe weather exposure" in Mortar Type and Mix). Bonding agents are not a substitute for proper joint preparation, and they should generally be avoided. If the joint is properly prepared, there will be a good bond between the new mortar and the adjacent surfaces. In addition, a bonding agent is difficult to remove if smeared on a masonry surface.

Mortar Type and Mix

Mortars for repointing projects, especially those involving historic buildings, typically are custom mixed in order to ensure the proper physical and visual qualities. These materials can be combined in varying proportions to create a mortar with the desired performance and durability. The actual specification of a particular mortar type should take into consideration all of the factors affecting the life of the building including: current site conditions, present condition of the masonry, function of the new mortar, degree of weather exposure, and skill of the mason.

Thus, no two repointing projects are exactly the same. Modern materials specified for use in repointing mortar should conform to specifications of the American Society for Testing and Materials (ASTM) or comparable federal specifications, and the resulting mortar should conform to ASTM C 270, Mortar for Unit Masonry.

Specifying the proportions for the repointing mortar for a specific job is not as difficult as it might seem. Five mortar types, each with a corresponding recommended mix, have been established by ASTM to distinguish high strength mortar from soft flexible mortars. The ASTM designated them in decreasing order of approximate general strength as Type M (2,500 psi), Type S (1,800 psi), Type N (750 psi), Type O (350 psi) and Type K (75 psi). (The letters identifying the types are from the words MASON WORK using every other letter.) Type K has the highest lime content of the mixes that

Here, a hammer and chisel are being correctly used to prepare a joint for repointing. Photo: John P. Speweik.

contain portland cement, although it is seldom used today, except for some historic preservation projects. The designation "L" in the accompanying chart identifies a straight lime and sand mix. Specifying the appropriate ASTM mortar by proportion of ingredients, will ensure the desired physical properties. Unless specified otherwise, measurements or proportions for mortar mixes are always given in the following order: cement-lime-sand. Thus, a Type K mix, for example, would be referred to as 1-3-10, or 1 part cement to 3 parts lime to 10 parts sand. Other requirements to create the desired visual qualities should be included in the specifications.

The strength of a mortar can vary. If mixed with higher amounts of portland cement, a harder mortar is obtained. The more lime that is added, the softer and more plastic the mortar becomes, increasing its workability. A mortar strong in compressive strength might be desirable for a hard stone (such as granite) pier holding up a bridge deck, whereas a softer, more permeable lime mortar would be preferable for a historic wall of soft brick. Masonry deterioration caused by salt deposition results when the mortar is less permeable than the masonry unit. A strong mortar is still more permeable than hard, dense stone. However, in a wall constructed of soft bricks where the masonry unit itself has a relatively high permeability or vapor transmission rate, a soft, high lime mortar is necessary to retain sufficient permeability.

Budgeting and Scheduling

Repointing is both expensive and time consuming due to the extent of handwork and special materials required. It is preferable to repoint only those areas that require work rather than an entire wall, as is often specified. But, if 25 to 50 per cent or more of a wall needs to be repointed, repointing the entire wall may be more cost effective than spot repointing.

Total repointing may also be more sensible when access is difficult, requiring the erection of expensive scaffolding (unless the majority of the mortar is sound and unlikely to require replacement in the foreseeable future). Each project requires judgement based on a variety of factors. Recognizing this at the outset will help to prevent many jobs from becoming prohibitively expensive.

When repairing this stone wall, the mason matched the raised profile of the original tuckpointing. Photo: NPS files.

In scheduling, seasonal aspects need to be considered first. Generally speaking, wall temperatures between 40 and 95 degrees F (8 and 38 degrees C) will prevent freezing or excessive evaporation of the water in the mortar. Ideally, repointing should be done in shade, away from strong sunlight in order to slow the drying process, especially during hot weather. If necessary, shade can be provided for large-scale projects with appropriate modifications to scaffolding.

The relationship of repointing to other work proposed on the building must also be recognized. For example, if paint removal or cleaning is anticipated, and if the mortar joints are basically sound and need only selective repointing, it is generally better to postpone repointing until after completion of these activities. However, if the mortar has eroded badly, allowing moisture to penetrate deeply into the wall, repointing should be accomplished before cleaning. Related work, such as structural or roof repairs, should be scheduled so that they do not interfere with repointing and so that all work can take maximum advantage of erected scaffolding.

A mechanical grinder improperly used to cut out the horizontal joint and incompatible repointing have seriously damaged the 19th century brick. Photo: NPS files.

Building managers also must recognize the difficulties that a repointing project can create.The process is time consuming, and scaffolding may need to remain in place for an extended period of time. The joint preparation process can be quite noisy and can generate large quantities of dust which must be controlled, especially at air intakes to protect human health, and also where it might damage operating machinery. Entrances may be blocked from time to time making access difficult for both building tenants and visitors. Clearly, building managers will need to coordinate the repointing work with other events at the site.

Contractor Selection

Contractor Selection The ideal way to select a contractor is to ask knowledgeable owners of recently repointed historic buildings for recommendations. Qualified contractors then can provide lists of other repointing projects for inspection. More commonly, however, the contractor for a repointing project is selected through a competitive bidding process over which the client or consultant has only limited control. In this situation it is important to ensure that the specifications stipulate that masons must have a minimum of five years' experience with repointing historic masonry buildings to be eligible to bid on the project. Contracts are awarded to the lowest responsible bidder, and bidders who have performed poorly on other projects usually can be eliminated from consideration on this basis, even if they have the lowest prices.

The contract documents should call for unit prices as well as a base bid. Unit pricing forces the contractor to determine in advance what the cost addition or reduction will be for work which varies from the scope of the base bid. If, for example, the contractor has fifty linear feet less of stone repointing than indicated on the contract documents but thirty linear feet more of brick repointing, it will be easy to determine the final price for the work. Note that each type of work—brick repointing, stone repointing, or similar items—will have its own unit price. The unit price also should reflect quantities; one linear foot of pointing in five different spots will be more expensive than five contiguous linear feet.

Execution of the Work

Test Panels

These panels are prepared by the contractor using the same techniques that will be used on the remainder of the project. Several panel locations—preferably not on the front or other highly visible location of the building—may be necessary to include all types of masonry, joint styles, mortar colors, and other problems likely to be encountered on the job.

Unskilled repointing has negatively impacted the character of this late-19th century building. Photo: NPS files.

If cleaning tests, for example, are also to be undertaken, they should be carried out in the same location. Usually a 3 foot by 3 foot area is sufficient for brickwork, while a somewhat larger area may be required for stonework. These panels establish an acceptable standard of work and serve as a benchmark for evaluating and accepting subsequent work on the building.

Joint Preparation

Old mortar should be removed to a minimum depth of 2 to 2-1/2 times the width of the joint to ensure an adequate bond and to prevent mortar "popouts." For most brick joints, this will require removal of the mortar to a depth of approximately Ω to 1 inch; for stone masonry with wide joints, mortar may need to be removed to a depth of several inches. Any loose or disintegrated mortar beyond this minimum depth also should be removed.

Although some damage may be inevitable, careful joint preparation can help limit damage to masonry units. The traditional manner of removing old mortar is through the use of hand chisels and mash hammers. Though labor-intensive, in most instances this method poses the least threat for damage to historic masonry units and produces the best final product.

The most common method of removing mortar, however, is through the use of power saws or grinders. The use of power tools by unskilled masons can be disastrous for historic masonry, particularly soft brick. Using power saws on walls with thin joints, such as most brick walls, almost always will result in damage to the masonry units by breaking the edges and by overcutting on the head, or vertical joints.

However, small pneumatically-powered chisels generally can be used safely and effectively to remove mortar on historic buildings as long as the masons maintain appropriate control over the equipment. Under certain circumstances, thin diamond-bladed grinders may be used to cut out *horizontal* joints only on hard portland cement mortar common to most early-20th century masonry buildings. Usually, automatic tools most successfully remove old mortar without damaging the masonry units when they are used in combination with hand tools in preparation for repointing. Where horizontal joints are uniform and fairly wide, it may be possible to use a power masonry saw to assist the removal of mortar, such as by cutting along the middle of the joint; final mortar removal from the sides of the joints still should be done with a hand chisel and hammer. Caulking cutters with diamond blades can sometimes be used successfully to cut out joints without damaging the masonry. Caulking cutters are slow; they do not rotate, but vibrate at very high speeds, thus minimizing the possibility of damage to masonry units. Although mechanical tools may be safely used in limited circumstances to cut out horizontal joints in preparation for repointing, they should never be used on vertical joints because of the danger of slipping and cutting into the brick above or below the vertical joint. Using power tools to remove mortar without damaging the surrounding masonry units also necessitates highly skilled masons experienced in working on historic masonry buildings. Contractors should demonstrate proficiency with power tools before their use is approved.

Using any of these power tools may also be more acceptable on hard stone, such as quartzite or granite, than on terra cotta with its glass-like glaze, or on soft brick or stone. The test panel should determine the acceptability of power tools. If power tools are to be permitted, the contractor should establish a quality control program to account for worker fatigue and similar variables.

Mortar should be removed cleanly from the masonry units, leaving square corners at the back of the cut. Before filling, the joints should be rinsed with a jet of water to remove all loose particles and dust. At the time of filling, the joints should be damp, but with no standing water present. For masonry walls—limestone, sandstone and common brick—that are extremely absorbent, it is recommended that a continual mist of water be applied for a few hours before repointing begins.

Mortar Preparation

Mortar components should be measured and mixed carefully to assure the uniformity of visual and physical characteristics. Dry ingredients are measured by volume and thoroughly mixed before the addition of any water. Sand must be added in a damp, loose condition to avoid over sanding. Repointing mortar is typically pre-hydrated by adding water so it will just hold together, thus allowing it to stand for a period of time before the final water is added. Half the water should be added, followed by mixing for approximately 5 minutes. The remaining water should then be added in small portions until a mortar of the desired consistency is reached. The total volume of water necessary may vary from batch to batch, depending on weather conditions. It is important to keep the water to a minimum for two reasons: first, a drier mortar is cleaner to work with, and it can be compacted tightly into the joints; second, with no excess water to evaporate, the mortar cures without shrinkage cracks. Mortar should be used within approximately 30 minutes of final mixing, and "retempering," or adding more water, should not be permitted.

Using Lime Putty to Make Mortar

Mortar made with lime putty and sand, sometimes referred to as roughage or course stuff, should be measured by volume, and may require slightly different proportions from those used with hydrated lime. No additional water is usually needed to achieve a workable consistency because enough water is already contained in the putty. Sand is proportioned first, followed by the lime putty, then mixed for five minutes or until all the sand is thoroughly coated with the lime putty. But mixing, in the familiar sense of turning over with a hoe, sometimes may not be sufficient if the best possible performance is to be obtained from a lime putty mortar. Although the old practice of chopping, beating and ramming the mortar has largely been forgotten, recent field work has confirmed that lime putty and sand rammed and beaten with a wooden mallet or ax handle, interspersed by chopping with a hoe, can significantly improve workability and performance. The intensity of this action increases the overall lime/sand contact and removes any surplus water by compacting the other ingredients. It may also be advantageous for larger projects to use a mortar pan mill for mixing. Mortar pan mills which have a long tradition in Europe produce a superior lime putty mortar not attainable with today's modern paddle and drum type mixers.

For larger repointing projects the lime putty and sand can be mixed together ahead of time and stored indefinitely, on or off site, which eliminates the need for piles of sand on the job site. This mixture, which resembles damp brown sugar, must be protected from the air in sealed containers with a wet piece of burlap over the top or sealed in a large plastic bag to prevent evaporation and premature carbonation. The lime putty and sand mixture can be recombined into a workable plastic state months later with no additional water.

If portland cement is specified in a lime putty and sand mortar—Type O (1:2:9) or Type K (1:3:11)—the portland cement should first be mixed into a slurry paste before adding it to the lime putty and sand. Not only will this ensure that the portland cement is evenly distributed throughout the mixture, but if dry portland cement is added to wet ingredients it tends to "ball up," jeopardizing dispersion. (Usually water must be added to the lime putty and sand anyway once the portland cement is introduced.) Any color pigments should be added at this stage and mixed for a full five minutes. The mortar should be used within 30 minutes to 1Ω hours and it should not be retempered. Once portland cement has been added the mortar can no longer be stored.

Filling the Joint

Where existing mortar has been removed to a depth of greater than 1 inch, these deeper areas should be filled first, compacting the new mortar in several layers. The back of the entire joint should be filled successively by applying approximately 1/4 inch of mortar, packing it well into the back corners. This application may extend along the wall for several feet. As soon as the mortar has reached thumb-print hardness, another 1/4 inch layer of mortar—approximately the same thickness—may be applied. Several layers will be needed to fill the joint flush with the outer surface of the masonry. It is important to allow each layer time to harden before the next layer is applied; most of the mortar shrinkage occurs during the hardening process and layering thus minimizes overall shrinkage.

When the final layer of mortar is thumb-print hard, the joint should be tooled to match the historic joint. Proper timing of the tooling is important for uniform color and appearance. If tooled when too soft, the color will be lighter than expected, and hairline cracks may occur; if tooled when too hard, there may be dark streaks called "tool burning," and good closure of the mortar against the masonry units will not be achieved.

If the old bricks or stones have worn, rounded edges, it is best to recess the final mortar slightly from the face of the masonry. This treatment will help avoid a joint which is visually wider than the actual joint; it also will avoid creation of a large, thin featheredge which is easily damaged, thus admitting water. After tooling, excess mortar can be removed from the edge of the joint by brushing with a natural bristle or nylon brush. Metal bristle brushes should never be used on historic masonry.

Curing Conditions

The preliminary hardening of high-lime content mortars—those mortars that contain more lime by volume than portland cement, i.e., Type O (1:2:9), Type K (1:3:11), and straight lime/sand, Type "L" (0:1:3)—takes place fairly rapidly as water

in the mix is lost to the porous surface of the masonry and through evaporation. A high lime mortar (especially Type "L") left to dry out too rapidly can result in chalking, poor adhesion, and poor durability. Periodic wetting of the repointed area after the mortar joints are thumb-print hard and have been finish tooled may significantly accelerate the carbonation process. When feasible, misting using a hand sprayer with a fine nozzle can be simple to do for a day or two after repointing. Local conditions will dictate the frequency of wetting, but initially it may be as often as every hour and gradually reduced to every three or four hours. Walls should be covered with burlap for the first three days after repointing. (Plastic may be used, but it should be tented out and not placed directly against the wall.) This helps keep the walls damp and protects them from direct sunlight. Once carbonation of the lime has begun, it will continue for many years and the lime will gain strength as it reverts back to calcium carbonate within the wall.

Aging the Mortar

This 18th century pediment and surrounding wall exhibit distinctively different mortar joints. Photo: NPS files.

Even with the best efforts at matching the existing mortar color, texture, and materials, there will usually be a visible difference between the old and new work, partly because the new mortar has been matched to the unweathered portions of the historic mortar. Another reason for a slight mismatch may be that the sand is more exposed in old mortar due to the slight erosion of the lime or cement. Although spot repointing is generally preferable and some color difference should be acceptable, if the difference between old and new mortar is too extreme, it may be advisable in some instances to repoint an entire area of a wall, or an entire feature such as a bay, to minimize the difference between the old and the new mortar. If the mortars have been properly matched, usually the best way to deal with surface color differences is to let the mortars age naturally. Other treatments to overcome these differences, including cleaning the non-repointed areas or staining the new mortar, should be carefully tested prior to implementation.

Staining the new mortar to achieve a better color match is generally not recommended, but it may be appropriate in some instances. Although staining may provide an initial match, the old and new mortars may weather at different rates, leading to visual differences after a few seasons. In addition, the mixtures used to stain the mortar may be harmful to the masonry; for example, they may introduce salts into the masonry which can lead to efflorescence.

Cleaning the Repointed Masonry

If repointing work is carefully executed, there will be little need for cleaning other than to remove the small amount of mortar from the edge of the joint following tooling. This can be done with a stiff natural bristle or nylon brush after the mortar has dried, but before it is initially set (1-2 hours). Mortar that has hardened can usually be removed with a wooden paddle or, if necessary, a chisel.

Further cleaning is best accomplished with plain water and natural bristle or nylon brushes. If chemicals must be used, they should be selected with extreme caution. Improper cleaning can lead to deterioration of the masonry units, deterioration of the mortar, mortar smear, and efflorescence. New mortar joints are especially susceptible to damage because they do not become fully cured for several months. Chemical cleaners, particularly acids, should never be used on dry masonry. The masonry should always be completely soaked once with water before chemicals are applied. After cleaning, the walls should be flushed again with plain water to remove all traces of the chemicals.

Several precautions should be taken if a freshly repointed masonry wall is to be cleaned. First, the mortar should be fully hardened before cleaning. Thirty days is usually sufficient, depending on weather and exposure; as mentioned previously, the mortar will continue to cure even after it has hardened. Test panels should be prepared to evaluate the effects of different cleaning methods. Generally, on newly repointed masonry walls, only very low pressure (100 psi) water washing supplemented by stiff natural bristle or nylon brushes should be used, except on glazed or polished surfaces, where only soft cloths should be used.**

New construction "bloom" or efflorescence occasionally appears within the first few months of repointing and usually disappears through the normal process of weathering. If the efflorescence is not removed by natural processes, the safest way to remove it is by dry brushing with stiff natural or nylon bristle brushes followed by wet brushing. Hydrochloric (muriatic) acid, is generally ineffective, and it should not be used to remove efflorescence. It may liberate additional salts, which, in turn, can lead to more efflorescence.

Surface grouting is sometimes suggested as an alternative to repointing brick buildings, in particular. This process involves the application of a thin coat of cement-based grout to the mortar joints and the mortar/brick interface. To be effective, the grout must extend slightly onto the face of the masonry units, thus widening the joint visually. The change in the joint appearance can alter the historic character of the structure to an unacceptable degree. In addition, although masking of the bricks is intended to keep the grout off the remainder of the face of the bricks, some level of residue, called

"veiling," will inevitably remain. Surface grouting cannot substitute for the more extensive work of repointing, and it is not a recommended treatment for historic masonry.

***Additional information on masonry cleaning is presented in Preservation Briefs 1: Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings, Robert C. Mack, FAIA, and Anne E. Grimmer, Washington, D.C.: Technical Preservation Services, National Park Service, U.S. Department of the Interior, 2000; and Keeping it Clean: Removing Exterior Dirt, Paint, Stains & Graffiti from Historic Masonry Buildings, Anne E. Grimmer, Washington, D.C.: Technical Preservation Services, National Park Service, U.S. Department of the Interior, 1988.*

Visually Examining the Mortar and the Masonry Units

A simple *in situ* comparison will help determine the hardness and condition of the mortar and the masonry units. Begin by scraping the mortar with a screwdriver, and gradually tapping harder with a cold chisel and mason's hammer. Masonry units can be tested in the same way beginning, even more gently, by scraping with a fingernail. This relative analysis which is derived from the 10-point hardness scale used to describe minerals, provides a good starting point for selection of an appropriate mortar. It is described more fully in "The Russack System for Brick & Mortar Description" referenced in **Reading List** at the end of this Brief.

Mortar samples should be chosen carefully, and picked from a variety of locations on the building to find unweathered mortar, if possible. Portions of the building may have been repointed in the past while other areas may be subject to conditions causing unusual deterioration. There may be several colors of mortar dating from different construction periods or sand used from different sources during the initial construction. Any of these situations can give false readings to the visual or physical characteristics required for the new mortar. Variations should be noted which may require developing more than one mix.

1. Remove with a chisel and hammer three or four unweathered samples of the mortar to be matched from several locations on the building. (Set the largest sample aside--this will be used later for comparison with the repointing mortar). Removing a full representation of samples will allow selection of a "mean" or average mortar sample.
2. Mash the remaining samples with a wooden mallet, or hammer if necessary, until they are separated into their constituent parts. There should be a good handful of the material.
3. Examine the powdered portion—the lime and/or cement matrix of the mortar. Most particularly, note the color. There is a tendency to think of historic mortars as having white binders, but grey portland cement was available by the last quarter of the 19th century, and traditional limes were also sometimes grey. Thus, in some instances, the natural color of the historic binder may be grey, rather than white. The mortar may also have been tinted to create a colored mortar, and this color should be identified at this point.
4. Carefully blow away the powdery material (the lime and/or cement matrix which bound the mortar together).
5. With a low power (10 power) magnifying glass, examine the remaining sand and other materials such as lumps of lime or shell.
6. Note and record the wide range of color as well as the varying sizes of the individual grains of sand, impurities, or other materials.

Other Factors to Consider

Color

Regardless of the color of the binder or colored additives, the sand is the primary material that gives mortar its color. A surprising variety of colors of sand may be found in a single sample of historic mortar, and the different sizes of the grains of sand or other materials, such as incompletely ground lime or cement, play an important role in the texture of the repointing mortar. Therefore, when specifying sand for repointing mortar, it may be necessary to obtain sand from several sources and to combine or screen them in order to approximate the range of sand colors and grain sizes in the historic mortar sample.

Pointing Style

Close examination of the historic masonry wall and the techniques used in the original construction will assist in maintaining the visual qualities of the building. Pointing styles and the methods of producing them should be examined. It is important to look at both the horizontal and the vertical joints to determine the order in which they were tooled and whether they were the same style. Some late-19th and early-20th century buildings, for example, have horizontal joints that were raked back while the vertical joints were finished flush and stained to match the bricks, thus creating the illusion of horizontal bands. Pointing styles may also differ from one facade to another; front walls often received greater attention to mortar

detailing than side and rear walls. **Tuckpointing** is not true repointing but the application of a raised joint or lime putty joint on top of flush mortar joints. **Penciling** is a purely decorative, painted surface treatment over a mortar joint, often in a contrasting color.

Masonry Units

The masonry units should also be examined so that any replacement units will match the historic masonry. Within a wall there may be a wide range of colors, textures, and sizes, particularly with hand-made brick or rough-cut, locally-quarried stone. Replacement units should blend in with the full range of masonry units rather than a single brick or stone.

Matching Color and Texture of the Repointing Mortar

New mortar should match the unweathered interior portions of the historic mortar. The simplest way to check the match is to make a small sample of the proposed mix and allow it to cure at a temperature of approximately 70 degrees F for about a week, or it can be baked in an oven to speed up the curing; this sample is then broken open and the surface is compared with the surface of the largest "saved" sample of historic mortar.

If a proper color match cannot be achieved through the use of natural sand or colored aggregates like crushed marble or brick dust, it may be necessary to use a modern mortar pigment.

During the early stages of the project, it should be determined how closely the new mortar should match the historic mortar. Will "quite close" be sufficient, or is "exactly" expected? The specifications should state this clearly so that the contractor has a reasonable idea how much time and expense will be required to develop an acceptable match.

The same judgment will be necessary in matching replacement terra cotta, stone or brick. If there is a known source for replacements, this should be included in the specifications. If a source cannot be determined prior to the bidding process, the specifications should include an estimated price for the replacement materials with the final price based on the actual cost to the contractor.

Mortar Types (Measured by volume)

Designation	Cement	Hydrated Lime or Lime Putty	Sand
M	1	1/4	3 - 3 3/4
S	1	1/2	4–4 1/2
N	1	1	5–6
O	1	2	8–9
K	1	3	10–12
"L"	0	1	2 1/4–3

Suggested Mortar Types for Different Exposures

	Exposure		
Masonry Material	Sheltered	Moderate	Severe
Very durable: granite, hard-cored brick, etc.	O	N	S
Moderately durable:limestone, durable stone, molded brick	K	O	N
Minimally durable:soft hand-made brick	"L"	K	O

Summary and References

For the Owner/Administrator

The owner or administrator of a historic building should remember that repointing is likely to be a lengthy and expensive process. First, there must be adequate time for evaluation of the building and investigation into the cause of problems. Then, there will be time needed for preparation of the contract documents. The work itself is precise, time-consuming and noisy, and scaffolding may cover the face of the building for some time. Therefore, the owner must carefully plan the work to avoid problems. Schedules for both repointing and other activities will thus require careful coordination to avoid

unanticipated conflicts. The owner must avoid the tendency to rush the work or cut corners if the historic building is to retain its visual integrity and the job is to be durable.

For the Architect/Consultant

Because the primary role of the consultant is to ensure the life of the building, a knowledge of historic construction techniques and the special problems found in older buildings is essential. The consultant must assist the owner in planning for logistical problems relating to research and construction. It is the consultant's responsibility to determine the cause of the mortar deterioration and ensure that it is corrected before the masonry is repointed. The consultant must also be prepared to spend more time in project inspections than is customary in modern construction.

For the Masons

Successful repointing depends on the masons themselves. Experienced masons understand the special requirements for work on historic buildings and the added time and expense they require. The entire masonry crew must be willing and able to perform the work in conformance with the specifications, even when the specifications may not be in conformance with standard practice. At the same time, the masons should not hesitate to question the specifications if it appears that the work specified would damage the building.

Conclusion

A good repointing job is meant to last, at least 30 years, and preferably 50- 100 years. Shortcuts and poor craftsmanship result not only in diminishing the historic character of a building, but also in a job that looks bad, and will require future repointing sooner than if the work had been done correctly. The mortar joint in a historic masonry building has often been called a wall's "first line of defense." Good repointing practices guarantee the long life of the mortar joint, the wall, and the historic structure. Although careful maintenance will help preserve the freshly repointed mortar joints, it is important to remember that mortar joints are intended to be sacrificial and will probably require repointing some time in the future. Nevertheless, if the historic mortar joints proved durable for many years, then careful repointing should have an equally long life, ultimately contributing to the preservation of the entire building.

Useful Addresses

Brick Institute of America
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Reston, VA 22091

National Lime Association
200 N. Glebe Road, Suite 800
Arlington, VA 22203

Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077

Acknowledgments

Robert C. Mack, FAIA, is a principal in the firm of MacDonald & Mack, Architects, Ltd., an architectural firm that specializes in historic buildings in Minneapolis, Minnesota. **John P. Speweik, CSI**, Toledo, Ohio, is a 5th-generation stonemason, and principal in U.S. Heritage Group, Inc., Chicago, Illinois, which does custom historic mortar matching. **Anne E. Grimmer**, Senior Architectural Historian, National Park Service, was responsible for developing and coordinating the revision of this Preservation Brief, incorporating professional comments, and the technical editing.

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The original version of this brief, *Repointing Mortar Joints in Historic Brick Buildings*, was written by Robert C. Mack in 1976, and was revised and updated in 1980 by Robert C. Mack, de Teel Patterson Tiller, and James S. Askins.

This publication has been prepared pursuant to the National Historic Preservation Act of 1966, as amended, which directs the Secretary of the Interior to develop and make available information concerning historic properties. Technical

Preservation Services (TPS), National Park Service prepares standards, guidelines, and other educational materials on responsible historic preservation treatments for a broad public.

October 1998

Reading List

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Historic Preservation Commission Agenda Summary

November 7, 2022

Key Staff Contact: Elizabeth Kellums, Planner III – Historic Preservation, 970/350-9222

Title:
Public Hearing for Request for Certificate of Approval for Exterior Alterations at 1303 9th Avenue

Summary:
The applicant requests approval for a proposed porch rehabilitation project, which includes supporting the porch roof and posts, deconstruction of the concrete block porch walls, repair of deteriorated features and replacement with like material and design.

Recommended Action:
Approval.

Attachments:
Staff Report
Attachment A – Application & Narrative for Certificate of Approval
Attachment B – Current Photographs
Attachment C – Engineer Drawing/Report
Attachment D – Existing Site Map
Attachment E – Survey form and National Register Nomination form for 1303 9th Avenue
Attachment F – Preservation Brief #45 Preserving Historic Wood Porches

HISTORIC PRESERVATION COMMISSION SUMMARY

ITEM: Major Alteration Certificate of Approval

CASE NUMBER: HPDR2022-0011

PROJECT: Exterior Alterations: Porch Rehabilitation

LOCATION: 1303 9th Avenue, Nettleton-Mead House

APPLICANT: Brian Benner, on behalf of owner Mead Apartments LLC

CASE PLANNER: Elizabeth Kellums, Planner III – Historic Preservation

HISTORIC PRESERVATION COMMISSION HEARING DATE: November 7, 2022

HISTORIC PRESERVATION COMMISSION FUNCTION:

Review the proposal for compliance with Criteria and Standards for altering designated properties or contributing properties in an historic district in Section 24-1003j of the City of Greeley Municipal Code and approve or deny the request.

PROJECT OVERVIEW AND BACKGROUND:

Proposed Project

On September 28, 2022, applicant Brian Benner of Quality Renovations, on behalf of owner Mead Apartments LLC, submitted a complete application for rehabilitation of the porch to include the following:

-deconstruct and rebuild the concrete block porch wall,
-support existing porch roofing throughout the project,
-remove porch posts and railings,
-porch decking and framework repair and replacement with Trex,
-replace beams and fascia with matching wood fascia, and
-full reassembly of the porch and all details.

Please see the Application and Narrative for a Certificate of Approval (Attachment A), Current Photographs (Attachment B), Engineer Drawing/Report (Attachment C), Existing Site Map (Attachment D), Survey form and National Register Nomination form for 1303 9th Avenue (Attachment E), Preservation Brief #45 Preserving Historic Wood Porches (Attachment F).

Existing Conditions

The front porch foundation has settled in the southeast corner and the other portions of the porch are in poor condition, including the porch posts and framing, floor joists and portions of the columns and rails.

Background
The Historic Preservation Commission designated the Nettleton-Mead House based on historical, architectural and geographical significance on the Greeley Historic Register on November 10, 1997. It is also a contributing property in the Monroe Avenue Historic District and is listed individually on the National Register of Historic Places for National Register Criteria A, B and C, including for association with E.S. Nettleton and Ella Mead and as an example of Italianate architecture. The property is subject to review by the Historic Preservation Commission for alterations. The General Design Review Guidelines and the District Designation Plan for the Monroe Avenue Historic District apply to this property. Please see the Site Data section below for information on previously permitted work, including renovations.

Architectural Description
This residence is a rectangular, two-story, wood frame Italianate residence with a low-pitched hip roof. Roof features include a central pediment and wide overhanging boxed eaves with paired cornice brackets. Two brick chimneys are located near the southeast and northwest corners, respectively. A rusticated stone foundation supports frame walls with narrow lap siding. The vertically accentuated double-hung, one-over-one sash windows boast bracketed crowns. A full-width, single-story front porch features a central pediment and square chamfered posts with channeling. Matching balustrades grace the porch's floor and roof perimeters. A second-story square bay window with paired sash windows featuring round arches and a bracketed crown rests atop the porch pediment. Single-story and two-story square bay windows are located on the north and south elevations, respectively.

SITE DATA:

Legal Description:	GR 5521 N90' E150' L1 BLK105 City of Greeley, County of Weld, State of Colorado
Neighborhood:	Monroe Avenue Historic District
Designation:	Individually designated on the Greeley Historic Register and contributing building in the Greeley Historic Register designated Monroe Avenue Historic District; Individually listed in the National Register of Historic Places.
Year Property Built:	1871-72 (source: *Greeley Tribune*, 28 June 1871).
Architectural Style/Type:	Italianate
Zoning:	C-H (Commercial – High Intensity); there is no proposed change in use.
Dates of Significant Renovations:	Roof replacement permit; Owner; Mead Apartments LLC; Contractor and Applicant:

Quality Renovations and Restorations; Permit #ROOF2005-0090; Date: 5/6/2020; finaled 7/31/2020.

Certificate of Approval for reroof; Minor Alteration; Owner: Mead Apartments LLC; Contractor and Applicant: Quality Renovations and Restorations; Project #HPDR2020-0004; Approved 5/12/2020; Recording Number: 4591882; Recording Date: 5/20/2020.

Roof Replacement permit; Owner: Paul Richard; Contractor: Lazaro's Roofing; Permit #10090254; Date: 2/24/2010.

Minor Alteration Certificate of Approval for Roof Repair and Railing rebuild; Applicant: Paul & Julia Richard; Date of Approval 11/13/2006; Corrected COA: 1/2/2008; Recording #: 3528537; also Recording #3469771 – Date of Approval 9/20/2006.

Minor Alteration COA for replace rotted wood on the porch; Applicant: Paul & Julia Richard; Recording #: 3528536 – Date of Approval 9/20/2006.

Certificate of Approval to replace glass and metal frame front door with wood and glazed door and remove cinderblock infill on three facades of the porch, frame the openings and screen in as in historic photo; Owner & Applicant: Paul & Julia Richard; Approval Date: 9/9/2002; Recording #3002414; Recording Date: 11/5/2002.

Rental Certificate of Occupancy Approval; Owner: Paul W. Richard; Number of units: 4; No expiration date; Date: 9/30/1989.

Rental Certificate of Occupancy Approval; Owner: Paul W. Richard; Number of units: 4; Expiration Date: 9/23/1989; Date: 9/23/1986.

Sign Permit for 4'x8' sign; Biltrite Sign Service, date; Permit #770013; Date: 3/25/1977.

Stairwell on southwest corner added within last 25 years. Interior remodeling for use as apartments, 1977. No permit information for these alterations is available. No other significant alterations.

East front entrance replacement approved by HPC September 2002.

KEY ISSUES AND ANALYSIS:

The proposed work is evaluated according to the relevant criteria for alteration of designated properties, defined in Section 24-1003j of the Greeley Municipal Code, as follows in the staff analysis.

Greeley Municipal Code, Section 24-1003j Criteria and Standards

1. Alterations. Criteria and standards for alterations to a designated property or a property in a historic district are as follows:

(a) The effect of the alteration or construction upon the general historical or architectural character of the designated property.

(b) The architectural style, arrangement, texture and materials of existing and proposed construction, and their relationship to other buildings.

(c) The effects of the proposed work in creating, changing or destroying the exterior architectural features and details of the structure upon which the work shall be done.

(d) The compatibility of accessory structures and fences with the main structure on the site and with adjoining structures.

(e) The effect of the proposed work upon the protection, enhancement, perpetuation and use of the landmark or landmark district.

(f) Compliance with the current Secretary of the Interior's Standards for the Rehabilitation of Historic Properties, as defined in 24-1003.m.

(g) If the property is a non-contributing property in a historic district, then alterations will be in accordance with the district designation plan as recommended by the Commission and approved by City Council.

(h) Other requirements for alterations of a designated property or contributing property in a district as are required by the procedures and bylaws established by the Commission.

Secretary of the Interior's Standards for Rehabilitation

(1) A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.

(2) The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.

(3) Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other buildings will not be undertaken.

(4) Changes to a property that have acquired historic significance in their own right will be retained and preserved.

(5) Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.

(6) Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.

(7) Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.

(8) Archaeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

(9) New additions, exterior alterations or related new construction will not destroy historic materials, features and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.

(10) New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Applicable Guidelines from the District Designation Plan for the Monroe Avenue Historic District and the General Design Review Guidelines

Preservation of Original Features

Original materials and features, as well as the distinctive form, scale, and siting of a structure, contribute to its character and should be respected and preserved whenever

feasible. The distinguishing qualities and characteristics of the structure and its site should be preserved using the simplest means possible. It is important that the property retain a high percentage of original features to retain its integrity. This is especially true for individually designated properties.

3. *Respect the historic design character of the building.*
   Do not try to change its style or make it look older or more ornate than it really is. An honest approach enhances the significance of the structure.

4. *Protect and maintain significant features and stylistic elements.*
   Distinctive stylistic features or examples of skilled craftsmanship should be treated with sensitivity. The best preservation procedure is to maintain original features from the outset so that repair or replacement is not required.

5. *Preserve an existing original site features or original building materials and features.*
   a. *Preserve original wall and roof materials.*
   b. *Preserve original doors, windows, porches, and other architectural features.*
   c. *Preserve original site features such as set-back, steps, walls, fences, landscaping, and walkways.*
   d. *Avoid removing or altering original materials and features.*
   e. *If weatherization is necessary to maintain energy efficiency, do not remove original doors or windows. Select storm windows and doors that do not diminish the integrity of the original doors and windows.*

6. *Repair deteriorated historic features to the extent possible and replace only those elements that cannot be repaired.*
   a. *Patch, piece-in, splice, consolidate, or otherwise upgrade the existing material, using recognized preservation methods whenever possible, rather than remove the element.*
   b. *If disassembly of an original element is necessary for its repair or restoration, use methods that minimize damage to the original materials and replace the disassembled components in their original configuration.*

Porches

Porches are a uniquely residential feature. A porch is often one of the most important character-defining elements of the primary facade of a historic house. While preservation of all existing original porches is recommended, it is particularly important that front porches be preserved.

8. *Preserve the original porch where feasible.*
   a. *Replace missing posts and railings when necessary.*
   b. *Match the original proportions and spacing patterns of balusters.*
   c. *Avoid using wrought iron, metal pipe posts and railings, or unpainted lumber to replace historic features, unless it is historically appropriate.*

d. Although locating an addition to the rear is often a preferred alternative, it may involve the demolition of an original rear porch, which contributes to the character of the property. Consider other options, if feasible.

9. Reconstruct a replacement porch to match the original in form and detail, if documentary evidence exists and if reconstruction is necessary.
a. Use materials similar to the original wherever feasible.
b. Replace a porch only if documentary evidence exists.

10. Preserve the open character of a porch.
Avoid enclosing historic porches that were not originally enclosed.

Staff Analysis:
The proposed project complies with the applicable criteria and standards for the following reasons:

The proposed porch rehabilitation project includes supporting the porch roof and posts, deconstruction of the concrete block porch walls, repair of deteriorated features and replacement with like material and design. The repair of the porch would not change any features, as replacement would be as needed and with like materials, aside from the porch floor from wood to a composite material, such as Trex, a previously approved product that closely mimics wood but is a composite that is water resistant and durable. The proposed project would have a positive impact on the historical and architectural character of the property and district, as well as on the features of the house, as it would repair historic fabric and replace with like as needed, which meets the standards and guidelines. The proposed materials match or closely match the original materials and would be compatible with the existing building and district. The proposed project would have a positive impact on the protection, enhancement, perpetuation and use because it would prolong the use of the porch with needed preservation work. The proposed project would meet the Secretary of the Interior's Standards, since the historic materials would be retained and preserved, and replacement would be with like materials. The use of composite for the porch floor also meets the Standards because it would be similar in design, color and texture. It would restore deteriorated historic features. It meets the guidelines because it would be preserving the original porch. For these same reasons, the porch rehabilitation meets the Greeley Municipal Code Criteria in Section 24-1003(j) a, b, c, e, f, and h and meets the Secretary of the Interior's Standards, including Standards #2, 3, 4, 5, 6. For these same reasons, the proposed project also meets the design guidelines.

In summary, for these reasons, the proposed porch rehabilitation meets the Criteria and Standards in Section 24-1003(j) of the Greeley Municipal Code, including the Secretary of the Interior's Standards and the General Design Guidelines and District Designation Plan for the Monroe Avenue Historic District.

Section 24-1003(j) (1) Criteria and Standards Addressed: a, b, c, e, f, and h (Secretary's Standards #2, 3, 4, 5, 6) and the Design Guidelines for Preservation of Original Features and Porches.

PUBLIC NOTICE:
Greeley Municipal Code Section 24-1003(f) specifies public notification requirements for Certificate of Approval applications, specifically posting a sign at the property, readily visible by adjacent property owners and from the public right-of-way, no less than 14 days prior to the public hearing. The applicant posted notice at this property on October 18, 2022. On October 14, 2022, Staff emailed a letter of notification to the applicant with the date, time and location of the public hearing. Following posting of the sign, one inquiry was received via email from a resident of the house at 1303 9th Avenue asking for information about the sign. Staff emailed and explained that it is in a historic district and requires review for the work on the porch. No further inquiries have been received as of November 1, 2022.

STAFF RECOMMENDATION:
Approval

RECOMMENDED MOTION:
A motion that, based on the application received and the preceding analysis, the Commission finds that the proposal to rehabilitate the porch on the Nettleton-Mead House at 1303 9th Avenue meets (1) Criteria and Standards a, b, c, e, f, and h, including Secretary of the Interior's Standards #2, 3, 4, 5, 6 of Section 24-1003(j)(1) of the Greeley Municipal Code and therefore approve the Certificate of Approval.

ATTACHMENTS:
Attachment A – Application and Narrative for Certificate of Approval
Attachment B – Current Photographs
Attachment C – Engineer Drawing/Report
Attachment D – Existing Site Map
Attachment E – Survey form and National Register Nomination form for 1303 9th Avenue
Attachment F – Preservation Brief #45 Preserving Historic Wood Porches

City of Greeley
Community Development Department
Historic Preservation Office
1100 10th Street
Greeley, CO 80631
970.350.9222
www.greeleygov.com/hp

PROCEDURES FOR MAJOR ALTERATIONS TO A HISTORIC PROPERTY

Application Packet

The City of Greeley's Historic Preservation Code, Section 24-1003 of the Greeley Municipal Code, requires that no major exterior alteration be made to any designated historic property or any property within a designated historic district without a Certificate of Approval issued by the Historic Preservation Commission. Alteration means any act or process requiring a building permit, moving permit, demolition permit or sign permit for the reconstruction, moving, improvement or demolition of any designated property or district; or any other action in which a review by either the Historic Preservation Commission or the Historic Preservation Specialist is necessary under the Historic Preservation Code and/or the district designation plan and in accordance with the definitions of major and minor alterations. The Historic Preservation Commission issues Certificates of Approval to indicate its approval of major alterations. Major alteration means a modification to a structure that has potential to significantly alter the character of the property and includes, but is not limited to, window replacement; building addition; porch enclosure; reconstruction of a portion of the primary building; addition of dormers or other alteration to the roofline; reconstruction of features on a building; material replacement with a different material (e.g., siding); alteration or replacement of a character-defining feature; demolition; relocation; and new construction. Major alteration includes any modification that is not considered maintenance or a minor alteration. The Historic Preservation Commission makes all Certificate of Approval decisions for major alterations, which may be appealed to City Council. The Commission may approve, approve with conditions or deny applications.

The Commission will review the Certificate of Approval applications according to the following criteria and standards in Section 24-1003j of the Greeley Municipal Code:

(1) Criteria and standards for alterations to a designated property or a property in a historic district are as follows:

(a) The effect of the alteration or construction upon the general historical or architectural character of the designated property.

(b) The architectural style, arrangement, texture and materials of existing and proposed construction, and their relationship to the other buildings.

(c) The effects of the proposed work in creating, changing or destroying the exterior architectural features and details of the structure upon which the work shall be done.

(d) The compatibility of accessory structures and fences with the main structure on the site and with adjoining structures.

(e) The effect of the proposed work upon the protection, enhancement, perpetuation and use of the landmark or landmark district.

(f) Compliance with the current Secretary of the Interior's Standards for the Rehabilitation of Historic Properties, as defined in 24-1003(m).

(g) If the property is a noncontributing property in a historic district, then alterations will be in accordance with the district designation plan as recommended by the Commission and approved by City Council.
(h) Other requirements for alterations of a designated property or contributing property in a district as are required by the procedures and bylaws established by the Commission.

DEFINITIONS

Alteration means any act or process requiring a building permit, moving permit, demolition permit or sign permit for the reconstruction, moving, improvement or demolition of any designated property or district; or any other action in which a review by either the Historic Preservation Commission or the Historic Preservation Specialist is necessary under this Chapter and/or the district designation plan and in accordance with the definitions of major and minor alterations, for the purposes of this Chapter.

Maintenance, as used in this Chapter, means measures to protect and stabilize a property, including ongoing upkeep, protection and repair of historic materials and features. *Maintenance* shall include the limited and responsive upgrading of mechanical, electrical and plumbing systems and other Code-required work to make a property safe and functional.

Major alteration, for the purposes of this Chapter, means a modification to a structure that has potential to significantly alter the character of the property and includes, but is not limited to, window replacement; building addition; porch enclosure; reconstruction of a portion of the primary building; addition of dormers or other alteration to the roofline; reconstruction of features on a building; material replacement with a different material (e.g., siding); alteration or replacement of a character-defining feature; demolition; relocation; and new construction. *Major alteration* includes any modification that is not considered maintenance or a minor alteration.

Minor alteration, for the purposes of this Chapter, means a modification to a structure that does not significantly alter the character of the property and includes, but is not limited to, replacement of roof; installation and repair or replacement of gutters if exterior trim elements are not altered; reconstruction and/or repair of portions of secondary structures; addition or replacement of storm windows and doors to existing windows and doors; repair or replacement of architectural elements with the same material, design, size, color and texture; replacement of less than fifty percent (50%) of a porch railing; replacement of original material with the same material (e.g., replacing a portion of wood siding with wood siding of the same size, profile and type); removal of nonoriginal material, such as vinyl, aluminum, etc.; adding awnings; repainting masonry; and signs requiring a permit.

CERTIFICATE OF APPROVAL PROCESS

Step 1. Pre-Application Conference

- Consult with Historic Preservation Staff @ e-mail: elizabeth.kellums@greeleygov.com) or (970) 350-9222
- Receive Application Form for Certificate of Approval
- Review requirements with Historic Preservation Staff

Step 2. Formal Application

- Submit Application Form for Certificate of Approval and all required information through eTRAKiT on the City of Greeley website: http://greeleygov.com/services/etrakit
- Application requires owner signature if owner is not the applicant.
- Special information may be requested by the Commission if required for use by persons or groups providing advisory assistance.
- Incomplete applications will hold up the process. Additional information may be requested.

Step 3. Notification, Scheduling and Posting

- **Allow a minimum of 21 days from the receipt of the application to the date of the public hearing.** Additional time may be required on a case-by-case basis.
- The City will mail or email a notice of the hearing to the applicant and property owner no less than seven days prior to the hearing. The Historic Preservation Commission will hold the public hearing at a regularly scheduled meeting. They meet on the first and third Mondays of each month at 4:00 p.m.
- The City will post a sign at the property seven days prior to the hearing.

Step 4. Public Hearing

- Attend the Certificate of Approval Hearing. The formal hearing will follow a pre-written agenda as follows:

a. Chair Introduces Public Hearing Agenda Item
b. Historic Preservation Staff Report
c. Applicant presentation
d. Public comment.
   Names and addresses for the record
e. Applicant rebuttal
f. Chairman calls for motion and Commission discussion

Step 5. Disposition

- Approval or denial of the Application for Certificate of Approval shall be granted after the Commission has heard all interested parties and relevant evidence.
- If the Application is approved, alteration, relocation or demolition of the structure may not commence until the Certificate of Approval has been filed with the Weld County Clerk and Recorder and all required permits have been issued. ***The City will get the Certificate of Approval and required attachments, such as architectural drawings, recorded by the Clerk and Recorder.***
- ***If approved, work shall be completed within twelve (12) months of the date of Commission approval, with the option for two (2) six-month extensions, as approved by the Community Development Director.***

*__The applicant is responsible to pay all required recording fees. The Historic Preservation Staff will input the fee into TRAKiT and will inform the applicant of the cost of recording. Please provide payment in the form of electronic check or credit card through the eTRAKiT portal.__ Recording fees are $15 for the first page that is 8 ½" x 11" (letter) or 8 ½" x 14" (legal) and $5 for each additional page. For questions about what the recording fee will be, please contact the Historic Preservation Staff at 970.350.9222.

City of Greeley Community Development Department, Historic Preservation Office, 1100 10th Street, Greeley, CO 80631 970.350.9222
www.greeleygov.com/hp

APPLICATION FORM FOR CERTIFICATE OF APPROVAL

MAJOR ALTERATIONS

The City of Greeley's Historic Preservation Code, Section 24-1003 of the Municipal Code, requires that no exterior major alteration is permitted of any designated historic property or property within a designated historic district without a Certificate of Approval issued by the Historic Preservation Commission. **Please complete pages 5, 7, and 8 and add additional sheets as necessary.**

PROPERTY OWNER(S)

Name: Brian Mannlein
Address: Mead apartments LLC

Phone:
Cell phone: 970-267-7739
Email: brian.mannlein@cushwake.com

APPLICANT (if different From property owner)

Name: Brian Benner
Address: 109 Poudre bay- Windsor Colorado

Phone:
Cell phone: 720-237-3511
Email: brian@quality-renovations.net

HISTORIC PROPERTY

Name: Neddleton Mead house
Address: 1303 9th avenue
Historic District (if applicable):
Legal Description:

Certification: I certify that the information and exhibits herewith submitted are true and correct to the best of my knowledge.

Applicant (Print): Paul Donaghey Telephone: 720-434-5714

Signature: Date: 9/22/22

Property owner's signature required. If applicant is other than property owner, property owner approves of the applicant's proposed project.

Owner (Print): Telephone:

Signature: Date:

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MAJOR ALTERATIONS CERTIFICATE OF APPROVAL SUBMITTAL CHECKLIST

Include all pertinent information identified on the following page(s), as well as special information requested by Historic Preservation Staff. Add additional sheets for narrative/information as necessary. Additional copies may be requested by Staff, if required for use by persons or groups providing advisory assistance. Submit this application and all required attachments through the City of Greeley website project module of eTRAKiT:

http://greeleygov.com/services/etrakit

The need for additional documents, as listed below, will be determined in a consultation with Historic Preservation Staff and may include:

ALTERATIONS

☒ **Pre-application Conference (in person or phone) (not required)** 9/18/2022
Date

☐ **Application Form signed by applicant and owner (if different)**

☐ **For projects involving architectural drawings, one set 11"x17" (and larger if requested) scaled project drawing(s), including name, date, project address, north arrow, graphic scale, date of drawings, and name, address & phone of owner and designer (if drawings are needed); or**

☐ **Mock-Up of signs or awnings, as needed**

☐ **Product literature, if applicable, such as for window, roof projects, etc.**

☐ **If the proposal is for replacement of historic material, such as windows or siding, provide estimates from qualified contractors for repair and restoration and for replacement.**

☐ **Digital photos accurately representing existing materials, colors, and textures of each side of the building, site or structure to be affected. Date the photographs. Provide information about the view (such as view looking to the north), name of the photographer and about the subject of the photo.**

☐ **Narrative of the proposed project (please type or print legibly on a separate page) Please include responses to the following:**

a. **What is the proposed project? Include detailed information about materials, design, measurements, location on the building or property.**

Re-support porch structure. remove existing concrete block wall. Remove decking and framing. remove & dip strip columns, remove & dip strip railings. rebuild damaged areas to exact specifications of existing. Pour new caissons to new code depths (see engineer drawings) replace wall- build new pressure treated framing (all concealed to view) Install new 1/8" spaced composite decking (closest match possible to original doug fir decking) replace left side ceiling beams & wrap per existing w/ correct wood to match. re-install beams & railings. prime for paint

b. **Time constraints on the project/Project urgency?**
YES! Concrete needs to be completed before weather get too cold. The porch is in dire condition & this reconstruction is long overdue.

c. Identify which design guidelines relate to the project. Explain how the proposed project meets the guidelines. Provide justification if the proposed project does not meet the guidelines.

Guidelines are available for download on the City's historic preservation website, http://greeleygov.com/services/historic-preservation/documents
General guidelines are relevant for individually designated properties. District guidelines are also available for properties located with Greeley Historic Register designated districts.

Contact the Historic Preservation Office at 970.350.9222 or elizabeth.kellums@greeleygov.com for more information or for assistance.

Since we are fully rebuilding and leveling this porch back to its original state- any and all of your guidelines will be met or exceeded. The only exception is the decking type. Existing is a Douglass fir tongue and groove - this material was never suited for this climate and there are multiple repairs to the existing deck. Its existence and attachment to the structure are partially to blame for the current state of the porch. It allows moisture to soak into the wood deck and framing causing all sorts of failures. The decking replacement is a wood toned and wood grained composite- the closest match I could find to a fresh looking Douglass fir with linseed oil.


1303
Entire red block curtain wall for porch
gets disassembled and rebuilt


1303
Remove & replace beams & fascia


1303
All porch columns get removed, dip stripped & replaced


North porch rail gets removed dip stripped and replaced


Replace beam & facia
All front porch railings get removed, dip stripped & replaced

Proposed composite for porch floor

TCS ENGINEERING SERVICE

18630 County Rd 1
Berthoud, Colorado 80513

Phone: 970-532-3326
Fax: 970-532-4070
Email: tomcstrizki@hotmail.com

July 6, 2022

TO: Quality Renovation

From: Tom Strizki, TCS Engineering Service

RE: Front Porch Renovation to Historic property at 1303 9th Street, Greeley, CO

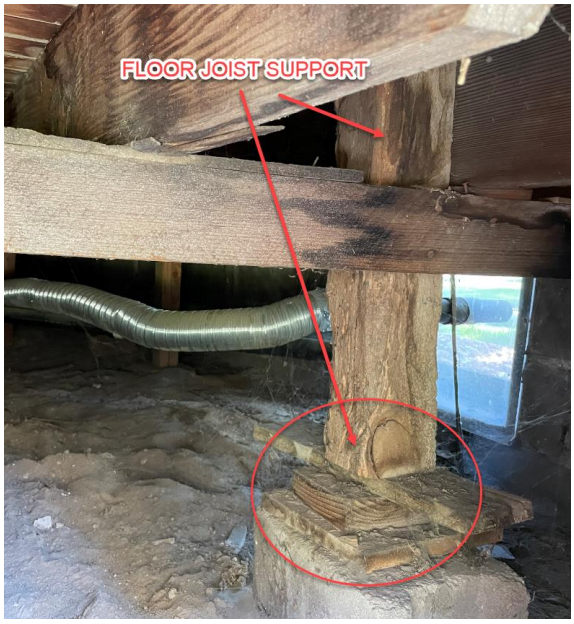
To whom it may concern,

An evaluation of the front porch structure was performed on June 6th, 2022 at the above address which is located in the historical district of Greeley. Because of its location, and work done to property must keep as much of the original architecture as possible to preserve its historical status.

PORCH EVALUATION

- Front porch has settled over the years, especially at the Southeast corner as shown below.

- Porch framing for decking and support posts is in poor condition. Floor joists have been propped up over the years with wood posts placed on and bricks or pieces of concrete.



- Deck posts and pillars have sight of wood decay due to weathering. Decay seems to be mostly cosmetic and the posts appear structurally sound and can be repaired.

- Wood deck is comprised of tongue and groove wood slats that have been painted to preserve the wood. Paint has broken down and wood deck is rotted in many places since there are no gaps to drain the water off the deck.

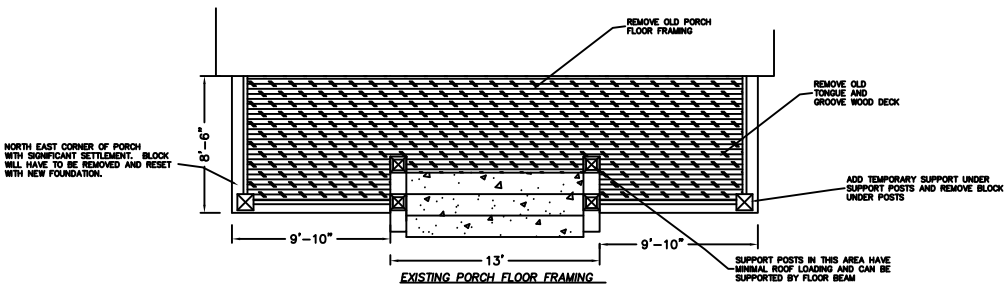
RECOMMENDED REPAIRS

- Porch tongue and groove decking will need to be completely removed.
- Porch framing will need to be completely replaced and a new support system will be designed to support the framing to the ground.
- It appears that the block skirting around the front of the porch is mostly cosmetic but has settled in areas. Where the block is structural is in the front corners and at the stair entrance under the wood posts. In these areas the block will need to be removed and a concrete pier added to support the posts and new framing of the rebuilt porch deck. This would be a total of 6 piers.
- New decking will be required for the front porch. It should be made of a composite material such that it is resistant to weather and water damage. It should be as close as possible to the old plank dimensions to preserve the historical look of the deck.
- Attached is a structural detail of the porch rebuild.

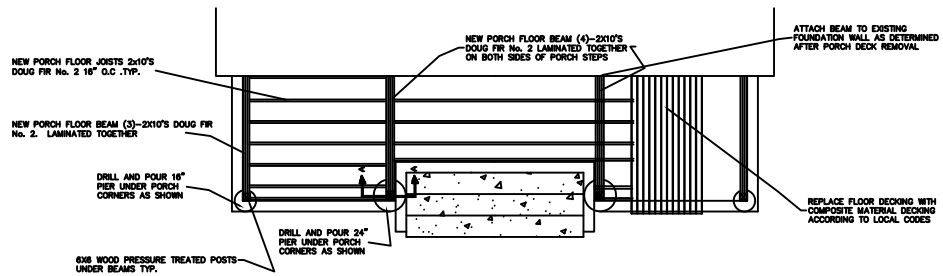
If there are any questions regarding this letter, please feel free to call my office at the above number.

Tom Strizki

TCS Engineering Service Colorado PE # 30989



EXISTING PORCH FLOOR FRAMING



NEW PORCH FLOOR FRAMING

STRUCTURAL NOTES

1. GOVERNING INFORMATION
   BUILDING CODE(S) 2018 IRC/IBC W/ LOCAL AMENDMENTS

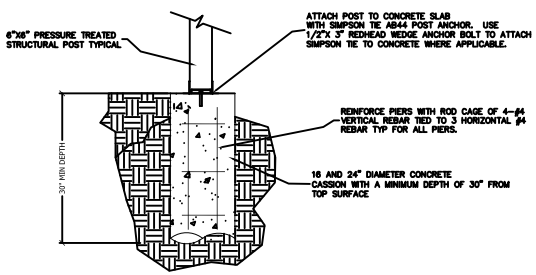
2. LOAD INFORMATION

ROOF:	DEAD	15 PSF
	SNOW (ROOF)	30 PSF
	(NO REDUCTION FOR SLOPE ALLOWED)	
FLOOR:	DEAD	15 PSF
	LIVE (RESIDENTIAL)	40 PSF
DECK:	DEAD	15 PSF
	LIVE (GROUND SNOW)	40 PSF
WIND:	BASIC WIND SPEED	112 MPH
	EXPOSURE B	
	IMPORTANCE - 1.00	
SEISMIC:		CLASS B

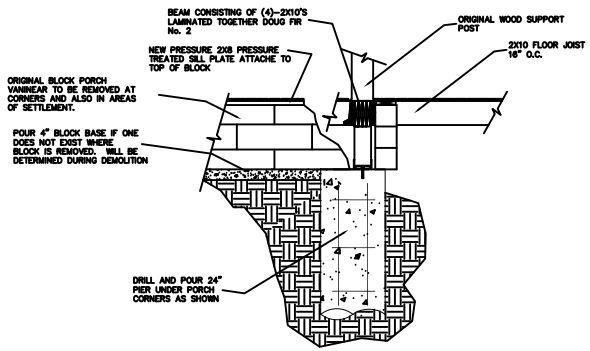
3. FOUNDATIONS

A. MAXIMUM ALLOWABLE SOIL BEARING PRESSURE: 1500 PSF

B. MINIMUM FROST DEPTH: 30" PER LOCAL AMENDMENT
C. ALL RECOMMENDATIONS OF SOILS REPORT TO BE FOLLOWED BY THE CONTRACTOR IF AVAILABLE.
D. ALL FOOTINGS SHALL BE PLACED ON FIRM, UNDISTURBED NATURAL SOIL. SOILS MAY ALSO BE PLACED ON PROPERLY COMPACTED BACKFILL AS APPROVED BY A LICENSED SOILS ENGINEER. THE BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY.
E. REINFORCED CONCRETE SLAB ON GRADE FLOORS SHALL BE PLACED ON PROPERLY COMPACTED FILL AS RECOMMENDED BY A LICENSED ENGINEER OR ON UNDISTURBED NATURAL SOIL.
F. CENTER ALL FOOTINGS AND PIERS UNDER WALLS, COLUMNS, OR GRID LINES UNLESS OTHERWISE NOTED ON PLANS.



S1 SUPPORT PIER DETAIL TYP
NOT TO SCALE



SECTION A-A

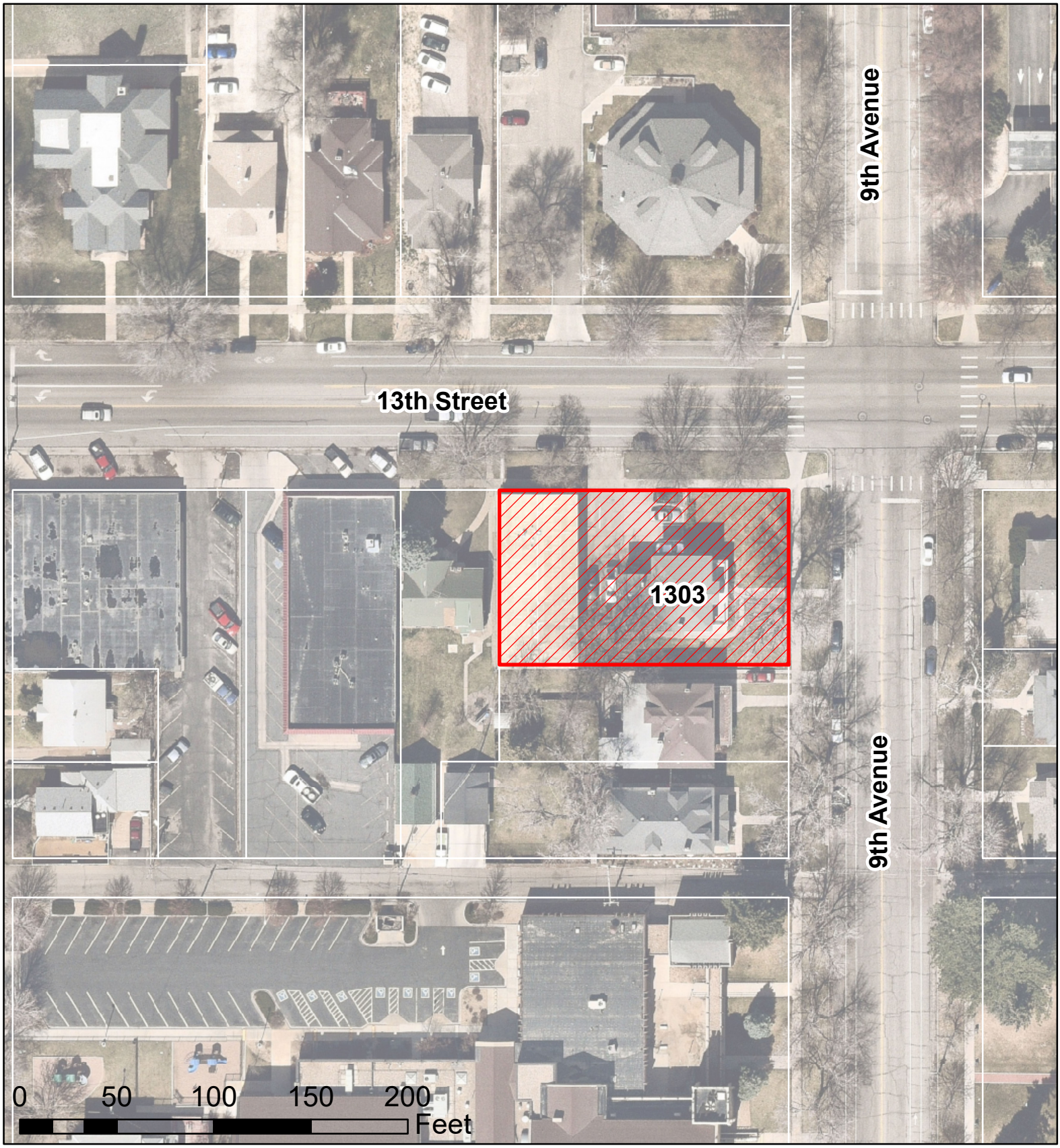
TCS ENGINEERING
18630 WELD COUNTY RD.1
BERTHOUD, CO 80513
970-532-3326

TITLE:
PORCH REBUILD DETAIL
1303 9TH ST. GREELEY CO

DWN: T.S	CHK: CHK.	SCALE: none	
SIZE: B	APP: FOUNDATION PLAN	DATE: 7-14-22	SHEET: 1 of 1
	DRAWING NO. DWG#: TCS-050106		REV.

1303 9th Avenue
Vicinity Map

ATTACHMENT D



1303 9th Ave.

Greeley Parcels

C-H (Commercial High Density) Zoning

City of Greeley Colorado

COMMUNITY DEVELOPMENT

ATTACHMENT E

Site Number 5WL2575

Please Note

Some of the items previously filed with this cultural resource record were not scanned. These items may include:

- Published and copyrighted materials - including newspaper and magazine clippings
- Bound material - including brochures and pamphlets
- Microfiche
- Negatives
- Computer disks or CDs
- Documents
- Items over 17 x 11

These items are now stored in the Supplementary Files in the Office of Archaeology and Historic Preservation at the Colorado Historical Society.

SHF

OAHP1403 SAB

COLORADO HISTORICAL SOCIETY
Office of Archaeology and Historic Preservation
1300 Broadway Denver, CO 80203

HISTORIC BUILDING INVENTORY

SITE NO.: 5WL2575

OFFICE USE ONLY
Eligible for National Register ___ yes ___ no
date ___ initials ___
Criteria ___ A ___ B ___ C ___ D
Contributes to a potential National Register district
___ yes ___ no district name ___
Eligible for State Register ___ yes ___ no
date ___ initials ___
Criteria ___ a ___ b ___ c ___ d ___ e
Areas of significance: ___
Period of significance ___
Needs data ___ date ___ initials ___

COUNTY: Weld

CITY: Greeley

HISTORIC BUILDING NAME: Nettleton House, Mead House

CURRENT BUILDING NAME: Nettleton House, Mead House

LOCAL LANDMARK DESIGNATION: [ ] yes [X] no
Date of designation:
Designating authority:

ADDRESS: 1303 9th Avenue
Greeley, CO 80631

P.M.: 6 township: 5N range: 65W
¼ of ¼ of ¼ of NW ¼ of section 8

OWNER NAME & ADDRESS:
Paul and Julia Richard
1313 9th Avenue
Greeley, CO 80631

UTM REFERENCE- Zone: 13
Easting: 526100
Northing: 4474010

USGS QUAD NAME: Greeley Quad.
Year: 1950/80 [X] 7.5' [ ] 15'

STYLE: Italianate

Block: 105
Lot(s): 11
Addition: Union Colony, 1870
Year of addition:

BUILDING TYPE:

[X] original location [ ] moved
Date of moves(s):

MATERIALS: Frame, wood.

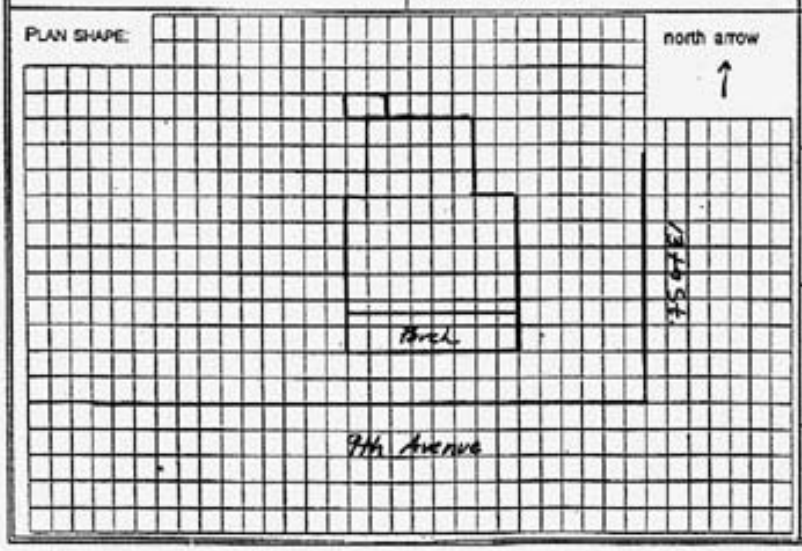
HISTORIC USE: Residence
PRESENT USE: Apartments

STORIES: 2

OVERALL BUILDING DIMENSIONS: 2956 sq. ft.

DATE OF CONSTRUCTION- estimate: 1871 actual: 1871
Source of information:
Greeley Tribune, 28 June 1871

PLAN SHAPE:



ARCHITECT: Unknown
Source of information:

BUILDER/CONTRACTOR: Unknown
Source of information:

ORIGINAL OWNER: E. S. Nettleton
Source of information:
Greeley Tribune, June 1871

ASSOCIATED BUILDINGS- [ ] yes [X] no
Type:

ARCHITECTURAL DESCRIPTION

See continuation sheet.

X additional page(s)

PHOTOGRAPHS (include photographs showing each side of building and any associated buildings)

Film roll no.: WL-82
Negative no.: 6-9

Photographer: Ben Fogelberg
Location of negatives: Greeley Historic Preservation Office

CONSTRUCTION HISTORY (include description and dates of major additions, alterations, or demolitions):

Exterior painting and interior remodeling, 1977. Stairwell on southwest corner added within last 25 years.

___ additional page(s)

HISTORICAL BACKGROUND (discuss important persons and events associated with this building):

See continuation sheet.

X additional page(s)

INFORMATION SOURCES (be specific):

See continuation sheet.

X additional page(s)

SIGNIFICANCE (check appropriate categories)

Architectural significance:
[ ] represents the work of a master
[X] possess high artistic value
[X] represents a type, period, or method of construction

Historical significance:
[X] associated with significant person(s)
[X] associated with significant event
[X] associated with a pattern of events
[X] contributes to an historic district

National Register eligibility:
Individual [X] yes [ ] no
Criteria: [X] A [X] B [X] C [ ] D

Contributes to a potential district:
[X] yes [ ] no
District name: Meeker Neighborhood

Area(s) of significance: Engineering, agriculture, health/medicine, architecture
Period of significance: 1871-1961

THEME(S):
Architecture: Italianate
Water: Early High Plains irrigation and farming
Reform Era: Medical services

STATEMENT OF SIGNIFICANCE (briefly justify the significance checked above):

See continuation sheet.

X additional page(s)

INVENTORY COMPLETED BY: Ben Fogelberg
DATE: September 1997

AFFILIATION: City of Greeley Museums
PHONE: 970-350-9222

ADDRESS: 919 7th Street
Greeley, CO

PROJECT NAME: Greeley Historic Preservation Survey

Architectural description:
The 1871 Nettleton House is a rectilinear, two-story frame Italianate residence with a low-pitched hip roof. Roof features include a central pediment and wide overhanging boxed eaves with paired cornice brackets. Two brick chimneys are located near the southeast and northwest corners, respectively. A rusticated stone foundation supports frame walls with lap siding. The vertically accentuated double-hung one-over-one sash windows boast bracketed crowns. A full-width single-story front porch features a central pediment and square chamfered posts with channeling. Matching ballustrade's grace the porch's floor and roof perimeters. An oriel or second-story square bay window with paired sash windows featuring round arches and a bracketed crown rests atop the porch pediment. Single-story and two-story square bay windows are located on the north and south elevations, respectively.

Historical background:
This home is associated with E. S. Nettleton and Dr. Ella Mead, two individuals who contributed significantly to the history of Greeley, Weld County and the region.

In 1871, prominent engineer and surveyor Edwin S. Nettleton built the home and remained in residence for an unknown period of time. Nettleton joined Nathan Meeker's Union Colony during 1870, but was not an original member. The agricultural colony's Executive Committee recognized the value of his talents by hiring him to design irrigation canals. He worked on the No. 3 and No. 2 Ditches, which irrigated town lots and farmland with water diverted from the Cache la Poudre River. Historian Robert G. Dunbar referred to the No. 2 as "revolutionary" because it was the "first large canal to water extensive areas of benchland." In 1878 and 1879, Nettleton designed the Larimer and Weld Canal, a massive project envisioned by Benjamin Eaton and capitalized by the Colorado Mortgage and Investment Company. For many years, the Larimer and Weld was the largest irrigation system in the Cache la Poudre area. Among his many other achievements, Nettleton served as State Engineer for Colorado and was appointed to the board charged with supervising the construction of the state capitol building.

By 1901, Ella Mead's father, Alexander, owned the home. After attending college at Colorado A & M and the University of Denver Medical School, Dr. Ella Mead lived in the home until her death in 1961. After completing her medical training, Mead embarked upon a remarkable 50 year career as a physician and public servant. As the city health officer for Greeley, she helped establish one of the first birth control clinics in the nation and implemented a health screening system for the area's public schools. During her lifetime, she held many offices, including President of the Weld County Medical Society and Chairman of the Board of Councilors for the Colorado Medical Society. In 1958, she received the Medical Woman of the Year award from the National Medical Women's Association.

Statement of Significance:
The residence located at 1303 9th street in Greeley is a significant example of the Italiante style of architecture, popular in Colorado from 1870 to 1900. Contributing to the Meeker Neighborhood, the home is also significant due to its association with Edwin S. Nettleton and Dr. Ella Mead. Respectively, these individuals contributed in an important way to the community and region through the design of irrigation canals and service to the health of the area residents.

References:
City Directories for Greeley

Greeley Tribune, 21 June 1871.

Greeley Tribune, 1 May 1977.

"History of Agriculture," Robert G. Dunbar. In *Colorado and Its People*, ed. LeRoy Hafen, 121-157. New York: Lewis Historical Publishing Co., Inc., 1948.

Union Colony. Executive Committee. *Record Book No. 1 of the Executive Committee, April 21, 1870-October 4, 1870*

Weld County Assessor

Weld County Clerk and Recorder

1996

1996

1996

1996

NPS Form 10-900 OMB No. 10024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determination for individual properties and districts. See instruction in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Nettleton-Mead House

other names/site number Nettleton, Edwin S., House; Mead, Dr. Ella Avery, House; 5WL2575

2. Location

street & number 1303 9th Avenue [N/A] not for publication

city or town Greeley [N/A] vicinity

state Colorado code CO county Weld code 123 zip code 80631

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this [X] nomination [ ] request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property [X] meets [ ] does not meet the National Register criteria. I recommend that this property be considered significant [ ] nationally [ ] statewide [X] locally. ([ ] See continuation sheet for additional comments.)

Georgianna Contiguglia State Historic Preservation Officer December 13, 2004
Signature of certifying official/Title Date

State Historic Preservation Office, Colorado Historical Society
State or Federal agency and bureau

In my opinion, the property [ ] meets [ ] does not meet the National Register criteria.
([ ] See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is: Signature of the Keeper Date of Action

[ ] entered in the National Register
[ ] See continuation sheet.
[ ] determined eligible for the National Register
[ ] See continuation sheet.
[ ] determined not eligible for the National Register.
[ ] removed from the National Register
[ ] other, explain
[ ] See continuation sheet.

Nettleton-Mead House
Name of Property

Weld County, Colorado
County/State

5. Classification

Ownership of Property
(Check as many boxes as apply)

[X] private
[ ] public-local
[ ] public-State
[ ] public-Federal

Category of Property
(Check only one box)

[X] building(s)
[ ] district
[ ] site
[ ] structure
[ ] object

Number of Resources within Property
(Do not count previously listed resources.)

Contributing	Noncontributing	
1	0	buildings
0	0	sites
0	0	structures
0	0	objects
1	0	Total

Name of related multiple property listing.
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register.

0

6. Function or Use

Historic Function
(Enter categories from instructions)

Domestic: single dwelling

Current Functions
(Enter categories from instructions)

Domestic: multiple dwelling

7. Description

Architectural Classification
(Enter categories from instructions)

Italianate

Materials
(Enter categories from instructions)

foundation Sandstone
walls Weatherboard
roof Asphalt
other Brick

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

[X] **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.

[X] **B** Property is associated with the lives of persons significant in our past.

[X] **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

[ ] **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

Property is:

[ ] **A** owned by a religious institution or used for religious purposes.

[ ] **B** removed from its original location.

[ ] **C** a birthplace or grave.

[ ] **D** a cemetery.

[ ] **E** a reconstructed building, object, or structure.

[ ] **F** a commemorative property.

[X] **G** less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

Engineering
Health/Medicine
Architecture
Exploration/Settlement

Periods of Significance
1872-1874
1905-1958

Significant Dates
1872
1958

Significant Person(s)
(Complete if Criterion B is marked above).

Nettleton, Edwin S.
Mead, Dr. Ella Avery

Cultural Affiliation
N/A

Architect/Builder
Bentley

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography
(Cite the books, articles and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

[ ] preliminary determination of individual listing (36 CFR 67) has been requested

[ ] previously listed in the National Register

[ ] previously determined eligible by the National Register

[ ] designated a National Historic Landmark

[ ] recorded by Historic American Buildings Survey

#_____

[ ] recorded by Historic American Engineering Record

#_____

Primary location of additional data:

[X] State Historic Preservation Office

[ ] Other State Agency

[ ] Federal Agency

[X] Local Government

[ ] University

[ ] Other

Name of repository:
Colorado Historical Society
Greeley Museum Archives

Nettleton-Mead House
Name of Property

Weld County, Colorado
County/State

10. Geographical Data

Acreage of Property less than one

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing
1.	13	526100	4474010
2.			
3.			
4.			

[ ] See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Julia Richard

organization _____ date August 10, 2001

street & number 1313 9th Avenue telephone 970-351-7256

city or town Greeley state CO zip code 80631-4607

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps
A **USGS map** (7.5 or 15 minute series) indicating the property's location.
A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs
Representative **black and white photographs** of the property.

Additional Items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name Paul W. and Julia A. Richard

street & number 1313 9th Avenue telephone 970-351-7256

city or town Greeley state CO zip code 80631-4607

DESCRIPTION

The 1872 Nettleton-Mead House is sited on the southwest corner of the intersection of Ninth Avenue and Thirteenth Street, south of Greeley's downtown commercial district. The house sits on a 90 foot by 99 foot lot separated from the streets by concrete sidewalks and wide parking strips. Two 100-year-old maple trees stand at the front edge of the lawn bordering the entryway sidewalk. The lawn wraps around three sides of the house with the northwest portion of the lot devoted to a concrete parking lot. Foundation plantings off the east and north elevations complete the landscaping.

The Italianate style, irregular plan, two-story, woodframed and clapboard sided house is topped by a gently pitched, asphalt shingled, hip roof. The widely overhanging boxed eaves are supported by pairs of decorative brackets. The two brick chimneys with corbeled caps are located near the southeast and northwest corners. A full-width front porch with central pediment is supported by squared chamfered and fluted posts with roof eave brackets. Most of the windows are wood frame one-over-one double-hung sash covered by metal storm windows. The majority of the windows have bracketed crowns. The porch foundation is of rock-faced sandstone. The remainder of the house foundation is of dressed stone covered by a concrete parge coat. A wood skirt board wraps the building.

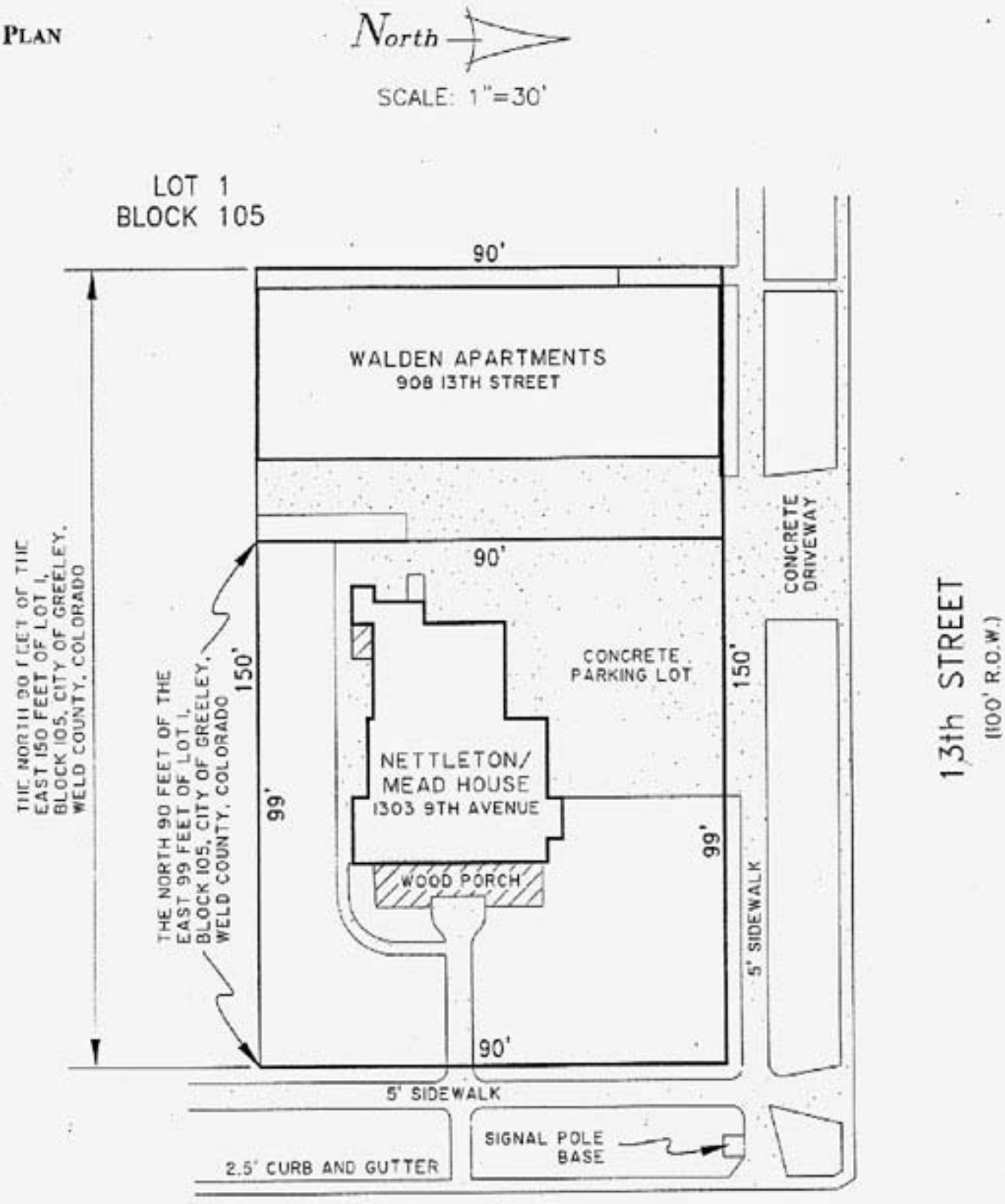
The house fronts east onto Ninth Avenue. The main entry is contained below a central second-story gable-roofed bay. The replacement door and side lights are fully glazed and aluminum framed. The original fluted pilaster wood surround remains. The second -story bay contains a pair narrow windows in a wood surround with semicircular crowns. Each side of the square-sided bay contains a single narrow sash.

The most distinctive feature on the north elevation is the one-story square-sided bay window. The bay roof is supported by channeled posts similar in design to those on the front porch. Pairs of decorative brackets spring from the capitals and support the wide overhangs of the flat roof. The apron below the bay windows is paneled. The remainder of the elevation fenestration consists of irregularly spaced sash of varying heights with typical eared trim supporting a cornice lentil.

The south elevation contains a two-story square-sided bay of similar design to that on the north elevation. The south elevation bay is wider, containing an additional window. The second-story contains a pair of off-center windows. The unsupported middle cornice brackets and the lack of a bracketed hood on the paired windows suggests a change to the original design of the second-story bay. It may have originally been an open porch. The remainder of the elevation fenestration consists of irregularly spaced sash of varying heights along with a first-floor and basement entry.

The west (rear) elevation is of plainer design than that of the other elevations. The eaves are supported by single brackets. The windows are not sheltered by bracketed hoods and the fenestration is minimal, including a first-story and basement entry. Two additions rise near the building's southwest corner – one of single story and the other two story. The hipped roofs of these additions have moderate overhangs supported by simple milled brackets.

SITE PLAN


North
SCALE: 1"=30'
LOT 1
BLOCK 105
90'
WALDEN APARTMENTS
908 13TH STREET
CONCRETE DRIVEWAY
90'
CONCRETE PARKING LOT
150'
150'
THE NORTH 90 FEET OF THE EAST 150 FEET OF LOT 1, BLOCK 105, CITY OF GREELEY, WELD COUNTY, COLORADO
THE NORTH 90 FEET OF THE EAST 99 FEET OF LOT 1, BLOCK 105, CITY OF GREELEY, WELD COUNTY, COLORADO
99'
99'
NETTLETON/ MEAD HOUSE
1303 9TH AVENUE
WOOD PORCH
5' SIDEWALK
90'
5' SIDEWALK
SIGNAL POLE BASE
2.5' CURB AND GUTTER
13th STREET
(100' R.O.W.)
9th AVENUE
(100' R.O.W.)

Some alterations have been made to the property in addition to those noted above. In 1977 the interior was reconfigured and remodeled for use as apartments. Little remains in the way of original or historic materials except for a few radiators and the second-floor staircase balustrade. The exterior foundation of the house, but not the porch foundation, has been plastered over. Also, a stairwell on the southwest corner was added some time since 1969.

The property is in good condition and although substantially altered on the interior, the structure retains its exterior integrity of location, setting, design, materials, workmanship, feeling, and association.

SIGNIFICANCE

The 1872 Nettleton-Mead house is significant under Criterion A for having been associated with the settlement of northeast Colorado. The Nettleton-Mead house is one of the few surviving residences which retains its physical integrity from the early years of the Union Colony. Nathan Meeker established the agricultural colony in 1870. The successful colony grew into the current city of Greeley.

The Nettleton-Mead House is significant under Criterion B for having been associated with the lives of Edwin S. Nettleton (1831-1901) and Dr. Ella Avery Mead (1874-1961), two individuals who contributed significantly to the history of Greeley and Weld County. Nettleton designed several early canals that brought critical irrigation water to the farmlands and urban homesteads of the Union Colony. His canals, perhaps more than any other single factor, lead to the initial success and sustained growth of the community. The 1872-1874 period of significance relates to Nettleton's ownership of the house.

Dr. Ella Mead became the first female doctor in the Greeley area, beginning her practice in 1905. She dedicated her professional life to the improvement of children and women's health. As the City Health Officer for Greeley she enforced quarantine laws, instituted milk inspections, and implemented a health screening system of the area's public schools. In 1920 Dr. Mead established one of the first birth control clinics in the nation. The 1905-1958 period of significance relates to the years in which she occupied the house as a practicing physician through the year in which she received several professional awards in recognition of her lifetime accomplishments.

The Nettleton-Mead House is also significant for its architecture. The house is an excellent example of a woodframe Italianate style residence. Intact woodframe residences of any style from the 1870s are rare, most having been significantly altered, lost to fire, or demolished. The Nettleton-Mead House is particularly important in that it exhibits the defining characteristics of the Italianate style as often used in early Greeley development and throughout Colorado.

ESTABLISHMENT OF THE UNION COLONY

Backed by *New York Tribune* newspaper editor Horace Greeley, Nathan Meeker founded the Union Colony of Colorado, the antecedent of Greeley, in 1870. It was no accident that Meeker chose 12,000 acres of land laying between the Cache la Poudre and South Platte Rivers. Meeker's intentions were to create a utopian community based on the principals of temperance, education, religion, cooperative effort, and irrigated agriculture.

The town of Greeley was originally platted on a grid system with a two-block park at its center and the Denver Pacific Railroad bisecting the town on a north-south line. The first colonists arrived in April of 1870 by Denver Pacific train. Most colonists were Easterners with moderate to large savings to invest in the bold experiment The first decade was characterized by a struggle first to subsist and later to prosper, mostly by agricultural means. Meeker encouraged the pioneers to live in the town of Greeley and

maintain farms on the surrounding bench lands of the Cache la Poudre River. The built landscape reflects this social arrangement, with schools, churches, homes and businesses located centrally to encourage development.

The later prosperity of Greeley led to the alteration and replacement of most of its early buildings. Intact surviving buildings from the 1870s are extremely rare. The Nettelton-Mead House is an important representative residence of the community's first decade.

EDWIN S. NETTLETON

Particularly important to the establishment and early growth of the Union Colony was the construction of the large scale irrigation canals. Union Colony marked the first attempt to irrigate large tracts of land in Colorado. Smaller scale irrigation began earlier in the Hispano settlements of the southern San Luis Valley and Ancestral Pueblos had engaged in irrigation in the southwest for generations. Before the arrival of the Union Colony, farming in eastern Colorado was seldom engaged in as a primary source of income. In Weld County prior to 1870, crops supplemented or augmented the business of cattle raising. Edwin Nettleson provided the catalyst for change.

Originally from Medina, Ohio, Edwin S. Nettleton joined Nathan Meeker's Union Colony during 1870 but was not an original member. Trained in civil and mechanical engineering, the agricultural colony's Executive Committee recognized the value of his talents by hiring him to design irrigation canals. The Union Colony articles of incorporation outlined four future ditch projects. Although three diversions from the Cache la Poudre River and one from the Big Thompson River were planned, only two were actually built by the Colony. Nettleton designed both. Ditch No. 3 (1870) and No. 2 (1871) irrigated town lots and farmland, respectively, with water diverted from the Cache la Poudre River. Historian Robert G. Dunbar referred to the No. 2 Ditch as "revolutionary" because it was the "first large canal to water extensive areas of benchland." The No. 2 Ditch brought water to 25,000 acres by moving it from the floodplain to lands distant from the stream via lateral ditches extending from a twenty-seven mile long, thirty-feet wide, and four-and-a-half-feet deep canal. The No. 3 and No. 2 Ditches still supply water to the agricultural lands around Greeley. The No. 2 Ditch, now also known as the New Cache, delivers water to 40,000 acres and the No. 3 waters 2,460 acres.

On August 10, 1871, Ovid Plumb deeded over Lot 1, Block 105 of the Union Colony to Edwin Nettleton. Nettleton hired a Mr. Bentley to build a two-story Italianate house, which was completed in 1872, on the corner lot of Monroe Avenue, later renamed Ninth Avenue. Nettleton's closest neighbors were the Meekers. The No. 3 Ditch he had designed for residential water ran just two blocks south. The home was reported to be one of the "handsomest" and most expensive in Greeley. The residence boasted the latest conveniences which included bathrooms and hot and cold running water. In October of 1874, Nettleton sold the property to Mrs. Carolina Packard.

Nettleton went on to be instrumental in planning the towns and waterways of Colorado Springs and Manitou Springs. In 1878 and 1879 he designed the Larimer-Weld Canal, a massive project envisioned by Benjamin Eaton and capitalized by the Colorado Mortgage and Investment Company. The Larimer-Weld is still the largest irrigation system in the Cache la Poudre area and delivers water to 50,000 acres. From 1880 to 1883 Nettleton engineered the High Line Canal in Denver. Nettleton also served as the second State Engineer for Colorado appointed by both Governors James Grant and Benjamin Eaton. During that time he designed a stream flow gauge that he named the *Colorado Current Meter*. In his final years he was connected with the United States Geological Survey and worked for the Department of Agriculture as well.

Always a dedicated professional, Nettleton died in Denver in 1901 at age sixty-nine. A few days prior to his death he over-exerted himself catching a train but continued to keep his work appointments in Utah and Wyoming. As his health worsened, he returned to Denver, was hospitalized, and then died of heart failure. Nettleton's work significantly impacted the settlement of Greeley and the region. His engineering projects brought all-important water to both homes and farmlands.

Dr. Ella Avery Mead

By 1901 the former Nettleton house was owned by Alexander Mead. The Mead family came to Greeley in 1878. Daughter Ella Avery graduated from Greeley High School in 1894 and she then attended Colorado A&M, graduating in 1898. In 1901 Mead entered the University of Colorado Medical School where she was the only woman in her class. Graduating with a Doctor of Medicine degree in 1903, she secured an 18-month internship at Denver General Hospital. "After I graduated," Dr. Mead later

commented, "I competed in an examination for internship and, though I took first place in the exam, it took a good deal of effort to get me an appointment for an internship at Denver General Hospital. There was a good deal of resistance to women interns at that time."

Dr. Mead returned to the family home in Greeley in 1905 to start her medical practice. She made her first house-calls by bicycle, hanging her medical bag over the handlebars. In time she purchased a two-cylinder Maxwell car but noted that horses were still necessary for country calls due to the muddy roads. Dr. Mead dedicated her professional life to the improvement of children and women's health. She served as the City Health Officer for Greeley in which capacity she enforced quarantine laws, instituted milk inspections, and implemented a health screening system of the area's public schools. In 1920 Dr. Mead established one of the first birth control clinics in the nation.

During her lifetime Dr. Mead held many offices including president of the Weld County Medical Society and chairman of the Board of Councilors for the Colorado Medical Society. In 1954 Dr. Ella Mead retired from the medical profession bringing to a close a remarkable 50-year career as Greeley's first female physician. In 1958 she received the Florence R. Sabin award from the Colorado Public Health Association. She was also one of eight in 1958 to be awarded the Medical Woman of the Year award from the National Medical Women's Association in Washington, D.C. She continued to live in the Nettleton-Mead House until her death in 1961.

ARCHITECTURE OF THE NETTLETON-MEAD HOUSE

The Nettleton-Mead House is an excellent example of the Italianate style as applied to a woodframe residence. Like many Victorian-era styles, Italianate emphasized vertical proportions and richly decorative detailing. It was found on residential, commercial, and industrial structures throughout Colorado from about 1870 up until the turn of the century.

Italianate is characterized by a low pitched hip roof, wide overhangs, bracketed cornice, a variety of fenestration (usually very tall, narrow, double-hung, one-over-one windows), molded window surrounds, and occasionally a cupola or balustrated balcony. Simple Italianate structures have a hip roof, bracketed eaves, and molded window surrounds. More elaborate or high style examples may feature arcaded porches, corner quoins, towers, and ornate detailing. There are also some Italianate structures that are flat roofed, with a front bay and entrance, and a decorated cornice.

The Nettleton-Mead House exhibits many of these defining characteristics, including: the low pitched hip roof; wide overhangs with bracketed eaves; tall, narrow, double-hung, one-over-one windows; molded window surrounds in the form of bracketed crowns; balustrated balcony; and a front entrance bay. The full-width porch is a common Italianate feature as are the square posts with beveled corners. The house falls into what residential architectural specialists Virginia and Lee McAlester have defined as the centered gable subtype. These are houses of both simple and compound plan having a front-facing gable. The gable is usually rather small and projects from a low-pitched hipped or side-gabled roof.

Frequently the front wall beneath the gable extends forward as a prominent central extension. About 15 percent of Italianate houses nationwide are of this subtype.

The Nettleton-Mead House is particularly important not just for its high degree of external integrity, but also for its being of woodframe construction. Wood framed and sided buildings are more subject to deterioration, storm damage, and fire than are those constructed of masonry. For this reason, woodframe Italianate style residences have steadily disappeared over the last century. The Nettleton-Mead is an important survivor of late nineteenth-century Colorado residential architecture.

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"Dr. Ella Mead Gets National MD Award." November 1958
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GEOGRAPHICAL DATA

VERBAL BOUNDARY DESCRIPTION

The North 90 feet of the East 99 feet of Lot 1, Block 105, City of Greeley, County of Weld, State of Colorado. The designation shall not include the West 51 feet of the North 90 feet of Lot 1, Block 105, City of Greeley, County of Weld, State of Colorado.

BOUNDARY JUSTIFICATION

Boundaries were determined by historic lot lines but exclude the west portion of the lot on which an apartment building was constructed in 1970.

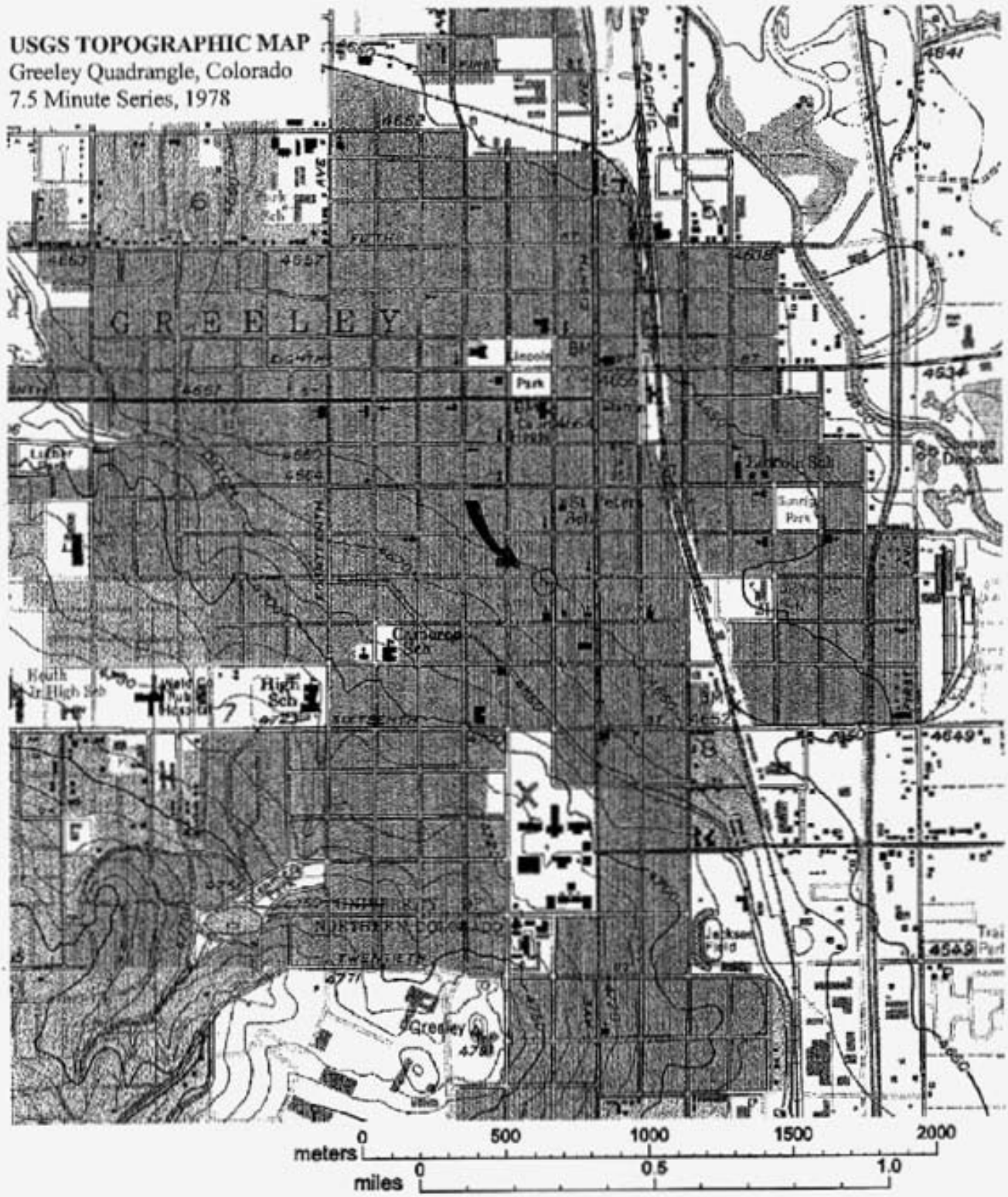
PHOTOGRAPH LOG

The following information pertains to photograph numbers 1-13, except as noted:

Name of Property: Nettleton-Mead House
Location: Greeley, Weld County, Colorado
Photographer: Julia Richard
Date of Photographs: August 27, 2001
Negatives: Possession of the photographer

Photo No.	Photographic Information
1	View of Ninth Avenue looking north towards the Nettleton-Mead House.
2	View of east elevation, looking northwest.
3	View of main entryway on east elevation, looking west.
4	View of north elevation, looking south.
5	View of north and west elevations, looking south.
6	View of south elevation, looking northwest.
7	View of brackets on northeast corner of porch and second story, looking west.
8	View of added stairwell to southwest corner of building, looking south.
9	View of brackets on west elevation of second story and stairwell addition, looking southeast.
10	View of south elevation stone foundation of porch and plastered foundation around house, looking north.
11	View of interior entryway since remodeling, looking west.
12	View of entryway hot water radiator. Similar radiators are found throughout the building.
13	View of second story banister, probably original to the house, looking west.

USGS TOPOGRAPHIC MAP
Greeley Quadrangle, Colorado
7.5 Minute Series, 1978



United States Department of the Interior

NATIONAL PARK SERVICE
1849 C Street, N.W.
Washington, D.C. 20240

The Director of the National Park Service is pleased to announce actions on the following properties for the National Register of Historic Places. For further information contact Edson Beall via voice (202) 343-1572, fax (202) 343-1836, regular or E-mail: Edson_Beall@nps.gov

Visit our web site at http://www.cr.nps.gov/nr

WEEKLY LIST OF ACTIONS TAKEN ON PROPERTIES: 4/01/02 THROUGH 4/05/02

KEY: State, County, Property Name, Address/Boundary, City, Vicinity, Reference Number, NHL, Action, Date, Multiple Name

COLORADO, COSTILLA COUNTY, Culebra River Villages of Costilla County MPS
COVER DOCUMENTATION ACCEPTED, 3/22/02

COLORADO, COSTILLA COUNTY, Plaza de San Luis de la Culebra, CO 159,
San Luis, 78000837,
ADDITIONAL DOCUMENTATION APPROVED, 3/22/02
(Culebra River Villages of Costilla County MPS)

COLORADO, DENVER COUNTY,
Photography and Armament School Buildings, Lowry Air Force Base,
125 and 130 Rampart Way and 7600 East First Place, Denver, 02000288,
LISTED, 4/02/02

COLORADO, MORGAN COUNTY, Morgan County Courthouse and Jail,
225 Ensign and 218 West Kiowa, Fort Morgan, 02000289, LISTED, 4/01/02

COLORADO, PITKIN COUNTY, Ute Cemetery, Ute Ave., Aspen, 02000291,
LISTED, 4/01/02

COLORADO, WELD COUNTY, Nettleton--Mead House,
1303 9th Ave., Greeley, 02000290, LISTED, 4/02/02

GEORGIA, CHEROKEE COUNTY, Canton Cotton Mills No. 2,
200 Ball Ground Hwy., Canton, 02000293, LISTED, 4/01/02

GEORGIA, THOMAS COUNTY, Paradise Park Historic District (Boundary Increase),
502 S. Broad St., Thomasville, 02000292, LISTED, 4/01/02

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45 PRESERVATION BRIEFS

Preserving Historic Wood Porches

Aleca Sullivan and John Leeke

National Park Service
U.S. Department of the Interior
Heritage Preservation Services

Few architectural features evoke more romantic notions or do more to define a building's historic character than the American porch. The size, style, detailing, and location of a porch can tell volumes about the age and use of a building. Each component, from handrail or baluster to column or post, enhances the architectural character of the porch. Alter or remove the porch and a historic building or streetscape can lose its visual integrity and historic authenticity (Fig 1).

Functionally, a porch protects an entrance from the weather. Yet open porches are constantly exposed to sun, snow, rain, and foot traffic, and thus subject to deterioration, perhaps more than other parts of a building. Wood porches are particularly vulnerable.

Deferred maintenance and neglect account for the decay and loss of countless numbers of historic porches each year. Deterioration from moisture and resultant wood rot, and damage caused by wood-eating insects are common problems that, when left unaddressed too long, can lead to the loss of significant historic fabric. Inappropriate repairs or insensitive alterations, such as the enclosure of a front porch, can be equally destructive and negatively affect the porch's appearance. All these things can alter a building's historic character. To preserve the character of the porch, as well as the historic building itself, it is essential to plan carefully before undertaking any work on a historic porch.

This Preservation Brief provides guidance for the everyday care of wood porches on older buildings. It focuses primarily on the maintenance and repair of wood porches, but acknowledges other, often challenging, work as well. This publication provides a brief history of the American porch and identifies its basic structural and decorative elements. It outlines how to assess the condition of a wood porch, how much work may be needed, and how to develop a specific scope of work. Detailed guidance on each level of work is provided, beginning with routine maintenance, followed by general repairs for various porch components, and concluding with replacement of parts that are beyond repair. Recommendations are provided for work that may require professional assistance. Although the Brief primarily addresses residential buildings, much of the information can be applied to wood porches on any structure.

Figure 1. Distinctive yet different, these front porches are important features along the street. The rhythm would be diminished if the front porch from one of the houses was dramatically altered or removed. Photo: Aleca Sullivan.

Evolution of the Porch

In colonial America, buildings in the northern colonies tended to echo British precedents with small gable-roofed extensions to protect main entrances. Whether open or enclosed, these extensions were called *porches* (from

Figure 2. Porches not only help define the architectural character of a building but also serve as living areas. They can be designed to take advantage of surrounding views. Cedar Grove, the home of the nineteenth-century landscape painter Thomas Cole, has an L-shaped veranda on the front and a two-story porch on the rear, providing an enviable view of the Catskill Mountains. Photo: Marilyn Kaplan.

Medieval English and the French word *porche*, which stems from the Latin, *porticus*). Also known as *porticos* when supported by columns, these covered entrances were sometimes designed to respect classical order and details, especially on more stylish buildings. Hooded doors or small covered entryways flanked by benches, often called *stoops* (from the Dutch *stoep* for step) that served as short covered transitions to and from the outdoors were common features, especially in New York and the mid-Atlantic colonies.

During the late 1700s and early 1800s as longer shed-roofed porches became more common, they were typically called *piazzas*, as they were then called in England. This term, still popular in some areas of North America, is adapted from the Italian word for open space or plaza. An alternate term for a long open porch, *veranda*, reflects British colonial design influence from the Indian sub-continent.

In French colonial areas, such as the Louisiana Territory, houses were often built with broad roofs extending well beyond the exterior walls to form surrounding porches, known as *galleries*. Porches were also important features of Spanish colonial buildings. In California, for example, many adobe ranches featured a *portal* with the roof supported by wooden posts. African and Caribbean influences can also be found in North American porch traditions.

By the late eighteenth and early nineteenth centuries, porches became more common in larger, wealthier areas such as Philadelphia, Boston and Charleston. In both the North and the South, formal colonnades with tall columns dressed in classical orders were sometimes added to help dignify public buildings, hotels, and mansions. This trend continued through the 1830s and 1840s, as the Greek Revival became the dominant architectural style in many areas of North America.

The social role of porches as a transition space between indoors and outdoors and as a link between private and public realms evolved during the 1800s. By offering grand entrances and sheltered landings with views of the surroundings, prominent porches became expected features of inns, hotels and resort spas, where they could serve as promenades, social gathering spots, and refuges for more private retreats. Porches were also added to private homes to serve many of these same functions (Fig 2). As the country began to thrive and expand, porches became more than just covered entrances or ceremonial features; they became an integral part of domestic social life

Some of the most significant factors that aided this shift were America's industrialization and later suburbanization. As improvements to mass production methods helped spur industrial growth, many Americans had more money to spend and more leisure time. Meanwhile a growing middle class was moving to new suburban neighborhoods. Inspired by the pattern books of Andrew Downing and George Woodward and the published designs of such architects as Alexander Jackson Davis and Calvert Vaux, the homes of these mid-1800s suburban neighborhoods were typically ornamented by elaborate porches dressed with fancy millwork. By this time, millwork catalogues and builders' pattern books offered a wide variety of designs for porch parts. With mass production, these fancy brackets and other ornamentation became less expensive, making it easier and more affordable to construct decorative porches (Fig 3). With mechanized wood turning lathes, the cost of posts, balusters and decorative spindle work also decreased to a level affordable by many. Adding a porch with wood ornamentation could enhance even the smallest and simplest of houses. Even older homes could be modernized with a fancy porch addition, stylized to the latest fashion trends. Such changes culminated in the large, highly decorated wrap-around porches of the Queen Anne style.

The second half of the nineteenth century was the golden era of porches. The social role of the porch increased as it evolved into an outdoor parlor, a true extension of the house into the landscape. Often partially screened by shrubs, porches could provide occupants with discreet opportunities for social contacts that might otherwise be difficult to achieve in an age obsessed with manners and proprieties. For many, sitting on the porch became an important part of their daily routine. Perhaps President Rutherford B. Hayes best summed up the love that Victorian-era Americans felt towards their porches when he recorded in his journal in 1873: "The best part of the present house is the veranda. But I would enlarge it. I want a veranda with a house attached."

By the early twentieth century, the hygiene movement, which stressed that access to fresh air could help prevent or remedy such diseases as tuberculosis, contributed to the development and proliferation of the sleeping porch.

These porches were usually located on the second floor next to bedrooms. This era also saw the rise in use of insect screening on porches to guard against the discomfort of mosquitoes and the diseases they spread, such as yellow fever and malaria.

While innovations fostered the proliferation of porches in the nineteenth century, new inventions helped lead to its decline in the twentieth. As the automobile boom of the early twentieth century made it easier for people to get out of the house for entertainment and relaxation, porches began to lose popularity, especially as architectural styles and social attitudes changed. With the telephone, neighbors and friends could chat without personally meeting. And housing styles popularized in the construction boom after World War II often omitted front porches all together as backyard patios became the focus of private outdoor activities. Finally in the mid-twentieth century the broad availability of air conditioning and television enticed many people to stay inside at night and brought the golden era of the American porch to an end.

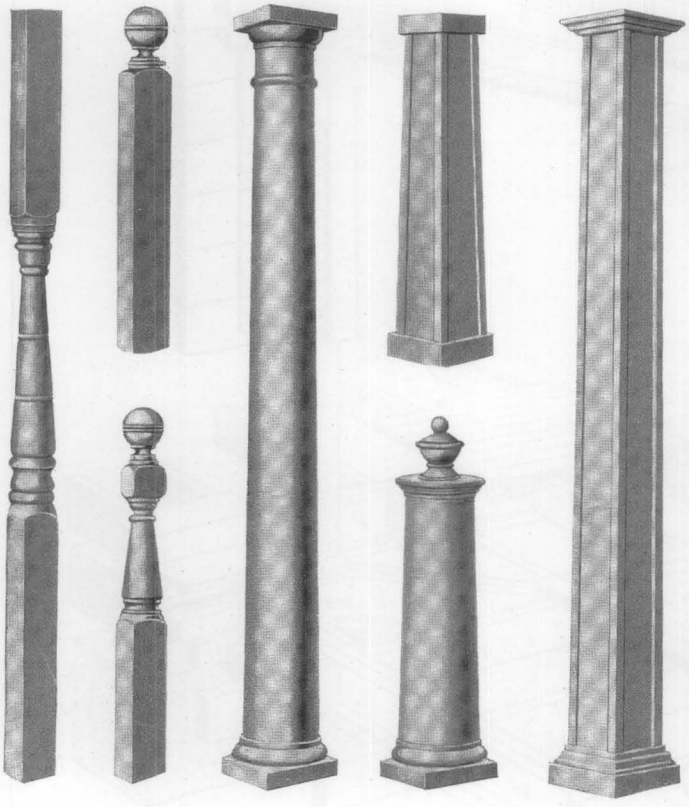


Figure 3. Throughout the late nineteenth and early twentieth centuries, millwork catalogues offered a wide variety of designs for porch parts, including columns, newels, balusters, spindles and brackets. As extolled in the Cedar Rapid Sash & Door Company's Standards Design Book, stock parts made embellishments to porches affordable both for new construction and "updating" existing homes. Courtesy of Charles Fisher.

Understanding the History and Significance of a Porch

In preserving historic buildings, it is important to understand the history and evolution of a particular structure and what features contribute to its historic character. This is especially applicable when working with historic porches since they usually are prominent features, significant to the character of a building.

Answers to the following questions will help establish the significance of a porch.

What has the porch looked like in the past? Early photographs, insurance maps, or tax records can provide useful information. These may be found at city or county offices, historical societies, libraries or even from former owners or neighbors. Such documents may indicate the footprint of the building or show long-lost details of the building's appearance. Physical evidence of historic porch footings may exist. Paint shadows of a former roofline or moldings can provide clues about details now missing. Old porch parts may have been "stored" under the deck during past repairs.

What, if any, changes have taken place to the historic porch over the years? On many porches elements such as columns, balusters, and finish details correspond with the design and detailing on the rest of the house. With other porches, the style of these features may differ from the rest of the building, but may reflect an important chapter in its history. Sometimes, parts of porches may have been lost due to neglect or remodeling. Questions about what historic fabric remains, what has been altered over time, and whether earlier changes are now an integral part of the historic character should be resolved before planning major porch work. Determining the historical evolution of the house may require both physical and archival research and in some cases the professional eye of an architectural historian.

What are the character defining features of the porch? The open qualities are one of the key features of most historic porches. Overall size, shape and design are obviously important components as well. There are numerous other contributing features which may exist, including the shape of the porch roof, the way a large porch is divided into distinct bays as with columns, the nature of the supporting foundation, the style and size of columns and balustrade, and whether the porch is raised or largely at grade. The simplicity of a porch or its richness in detail will also help define it. Materials are usually important as well, not just the wood features, but also whether other materials exist such as masonry columns and steps (Fig 4).

How does the porch contribute to the building's overall appearance? The size and location of a porch and how much of the historic features survive will help define its significance. A highly ornate porch across much of the front facade may be the most distinctive

The Anatomy of a Porch

a - Pier, penetrates ground, supports floor structural system and columns
b - Fascia covering floor framing
c - Floor (or deck)
d - Bed Molding covering joint between fascia and floor
e - Column supporting entablature above

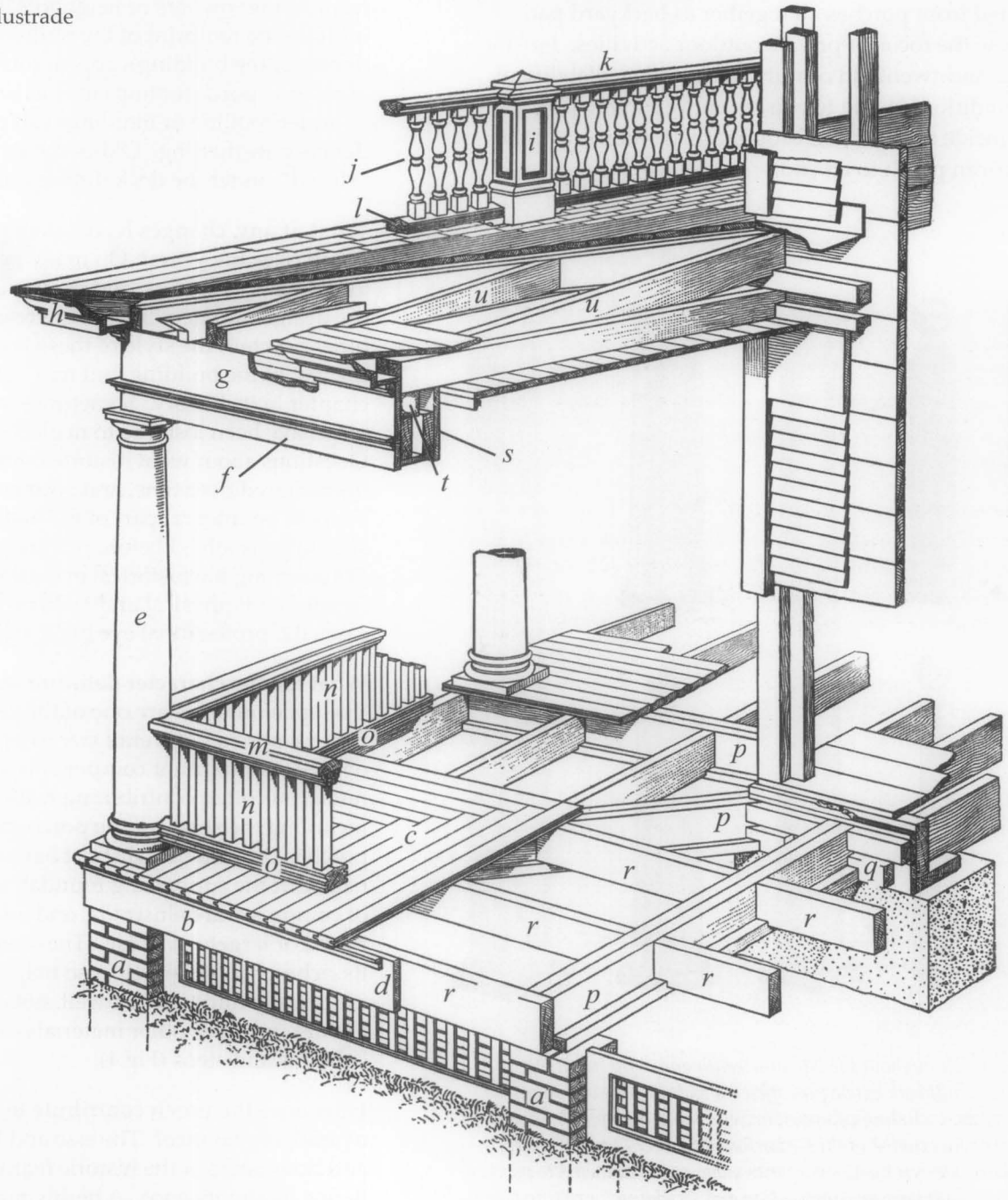
Entablature (f, g, h)
f - Architrave of entablature
g - Frieze of entablature
h - Cornice of entablature

Roof Railing (i, j, k, l)
i - Newel (or Pedestal) of roof railing
j - Balusters of balustrade
k - Top rail of balustrade
l - Bottom rail of balustrade

Balustrade around floor (m, n, o)
m - Top rail of balustrade
n - Balusters of balustrade
o - Bottom rail of balustrade

Structural system of deck (p, q, r)
p - Girder rests on piers and ledgers, support joists
q - Ledger fastened to house sill, supports girder
r - Joist fastened to girder, supports floor

Roof Structural System (s, t, u)
s - Beams inside the entablature span from column to column, support plate
t - Plate of the entablature rests on beams, supports roof rafters and ceiling beams
u - Rafter of the roof structural system



Drawing courtesy of Thomson Education Direct.

feature of the entire house, while a small simple porch on an otherwise plain cottage may be equally significant. The architectural style of a porch may relate to the building and may help define its character. Sometimes a later style porch may have been added to a building or may have replaced an earlier porch. In such cases, the later porch may have acquired importance in its own right. On the other hand, a later porch may be of such poor quality that it detracts from the building's historic character. Because porches are so diverse in terms of style, size, shape and detail, their significance should be assessed on a case-by-case basis with an understanding of the overall importance and evolution of the building.

Assessing the Condition

Before undertaking most repairs, it is important to assess the condition of the porch. The assessment is greatly facilitated if the porch has been regularly maintained and a record of past work is available. In most cases, however, a condition survey must rely almost exclusively on the physical examination of the porch, documenting the findings with notes, photographs or sketches.

Many older porches were constructed using good construction practices and materials. As a result, porches that are over 100 years old are not uncommon. Most porch deterioration can be attributed to the lack of proper maintenance. Important questions to address in assessing the condition of the porch include the following:

How is the porch constructed? A porch is rarely an independent, unattached structure. It may, however, have its own foundation, attached to the house only along the deck and the roof. Alternatively, it may be an included or engaged porch that is integrated with the actual structure of the house. The relationship between the porch and the house is important. If the outer support posts are decayed or if foundation piers are sinking, the roof structure may be pulling away from the house. Many porch decks are fastened to the main building on a ledger, a horizontal board along the house's foundation. A decaying ledger may compromise the structural integrity of the porch and can represent a major safety issue.

Are the foundation and structural members of the deck sound and providing adequate support for the deck, posts and roof above? The porch structure needs to be sound at every level. Therefore, a visual inspection of the underside of the porch is necessary to determine its condition. Major cracks in structural members, failed joints, significant wood rot, or evidence of widespread insect infestations (termites, carpenter ants or powder post beetles, for example) are usually signs of serious structural damage. Such conditions may require consultation with a professional architect,

Figure 4. Celebrating the 4th of July in 1912, this gathering of family and friends reflects the popularity of the porch as a social gathering place. While not overly ornate, each detail of the porch from the roof balustrade to the turned columns to the simple lattice work facing the deck contributes to its character, creating in effect the dominant architectural feature of the building. Photo: © Utah State Historical Society

engineer or building contractor familiar with old buildings. For an adequate assessment, it may be necessary to remove facing boards to check for potential decay in the structural sill behind (Fig 5).

What is the condition of the porch? Porch foundations may be a continuous wall of masonry, a series of masonry or wood piers or metal pipes, or a combination of these. Missing sections of the foundation, crumbling masonry mortar joints, or areas where the sill or joists no longer fully rests on the foundation may represent serious deficiencies. What appear to be deep foundation footings may only be stones or cement blocks sitting on top of the ground. The footings must be stable enough to adequately support the porch in its current or intended use. The smell of mold or appearance of fungal growth on wood beneath the porch is an indication of deficient air circulation and that conditions exist for wood decay. Recent changes that can contribute to deterioration should be identified for correction, such as a clothes dryer vent dumping warm moist air underneath the deck. The enclosure of original air vents in crawl spaces or the boarding up of latticework between piers are other changes that will usually promote an unwanted moist environment.

Are the porch posts providing adequate support? Posts, pillars or columns usually help support the porch roof or an upper deck. Establishing what the posts

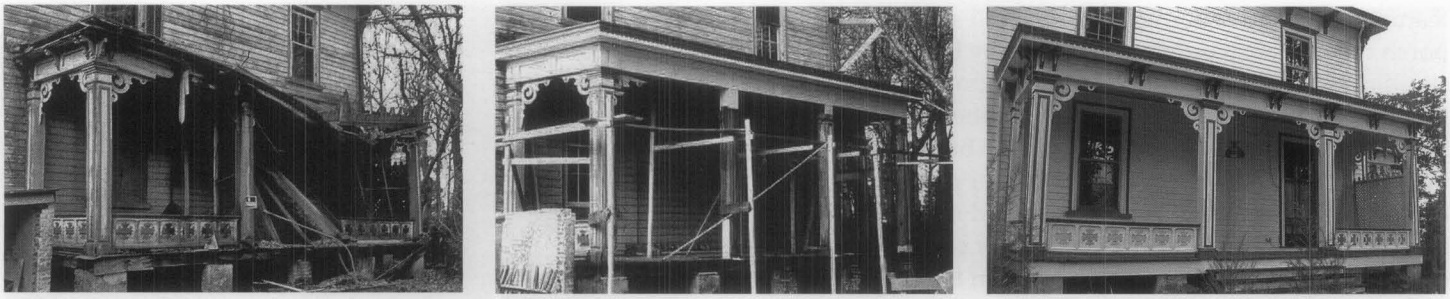


Figure 5. Even historic porches that appear to be in total disrepair may be repairable. While the roof needed replacement, much of this porch was repaired, including such features as the decorative columns, ornamental brackets, and balustrade. Photos: John Leeke.

are made of and how they are constructed will aid in understanding how they function and may deteriorate over time (Fig.6). Although the posts on a wood porch are commonly made of wood, they may be of masonry or metal or a combination of materials. Large round columns usually are made of wood staves similar to the way barrels are constructed; smaller diameter columns may be solid. A sag in the deck below or a faltering foundation can impact the supporting role of a column or post above. Wood columns and posts are prone to water seeping into open joints, particularly in the base and the lower end of the shaft. It is not uncommon to find that older columns have had patches and replacement bases.

Is the roofing and drainage system keeping the water away from the porch? Porches were designed to shed water. This means water will move away both from the building and the porch and not pond and saturate the wood. Continuously high moisture levels promote fungal growth that eventually causes wood to decay. Peeling paint on ceiling boards in a specific location is a sign of a possible roof leak. Clogged or missing downspouts and gutters can cause erosion at the foundation and can contribute to reverse-grade draining that is directing water under the porch instead of into the yard. Inadequately sloped porch floors can result in improper drainage and promote deterioration as exhibited, for example, by cupping floorboards.

What is the flooring condition? The porch component most subject to decay is the flooring. Often decay starts at the exposed ends of the boards or where cracks, checks or open joints have occurred and are exposed to the weather. Flooring should be checked frequently for peeling paint, rotted wood, and for loose, cupping or splintery boards. Where water is ponding, there is insufficient slope away from the building, a condition that should be corrected. Floor deterioration can also start in unlikely places such as the result of frequent hose washing to remove dirt or the placement of plant stands directly on the floor without proper moisture barriers. Firewood stored on a porch may trap moisture on the floor and harbor active insect infestation that can be ruinous to a wood porch. Thick floor mats and carpeting also may trap moisture, leading to premature decay.

Is there evidence of general wood decay? Wood deterioration may take different forms such as fungal decay, insect infestation or even sunlight degradation of exposed unfinished wood. Decay may be present where two wood surfaces meet and are not adequately protected from water, such as along open joints or behind moldings. Dark streaks, discoloration, and widespread peeling paint on a finished ceiling suggest excessive moisture or water leakage. It may be necessary to remove several finished boards to properly identify the cause of the problem and to insure damage has not extended to structural members behind. Trails of carpenter ants are another sign of potential decay since they will infest moist decaying wood. Where inadequate painting has left wood exposed for a long time, damage to the wood surface from light itself will occur, typically indicated by wood discoloration. Without sanding or scraping back to a sound wood surface, repainting will result in premature failure of the paint film.

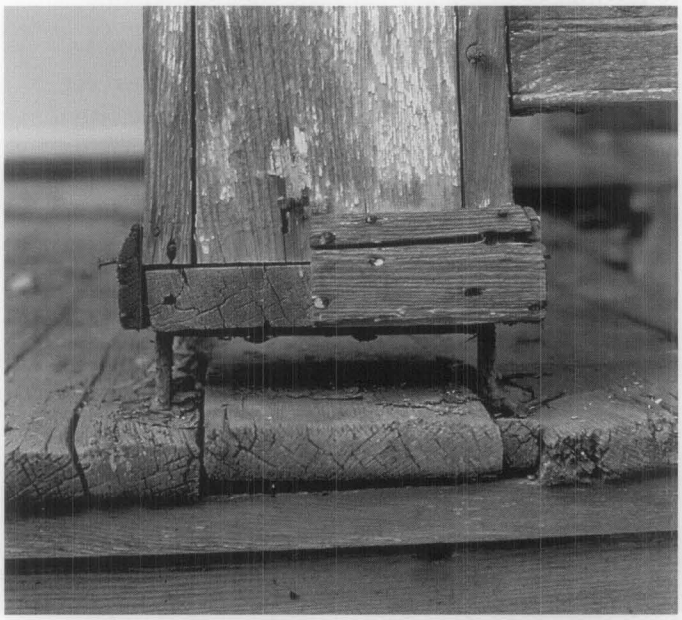


Figure 6. A traditional way to extend the life of porch posts was to place posts on metal feet, thereby providing a separation between the wood post and wood deck. This helped to prevent the wood post from rotting at the base. Early post feet were simple iron bars bent unto a stirrup shape. By the late nineteenth century manufactured cast-iron feet were common, consisting of a pair of disks separated by a short pipe. Post feet are still available today. Courtesy of Old-House Journal/Brian McNeil.

Are there open cracks or joints in the woodwork? Tightly sealed connections keep water out. Where individual boards come together, cracks in woodwork and joints can eventually become a major problem (Fig.7). Cracks are primarily caused by movement and water penetration. Movement of structural members beneath the finished woodwork can shift the position of individual boards and trim, breaking open the thin coating of paint over joints. This condition is common on porches with shallow foundations that are subject either to annual winter frost heaving or where soil conditions undergo major seasonal changes in moisture content. Changes in the moisture content of the wood itself due to repeated wetting and drying or changes in seasonal humidity can also cause noticeable expansion and shrinkage across the width of a board. This provides opportunities for water to penetrate unprotected areas.

Does peeling paint indicate deeper problems? An unbroken layer of paint covering all wood surfaces is the first line of defense against moisture causing decay. Over time, even hairline paint cracks can allow water to penetrate, causing paint to peel down to bare wood. Such peeling occurs near breaks in the film, at opened joints, or where the paint has been scratched or scraped. Peeling can also occur over large areas where there is high moisture and insufficient ventilation. Areas of particular concern include the crawl space beneath the porch deck, inside columns that lack ventilation, and in a roof structure that has a finished ceiling and lacks ventilation. If heavy paint build-up exists on columns, floors and trim, moisture can be trapped within the wood, resulting in the loss of paint adhesions and eventual wood decay.

Are trees, shrubbery and flowerbeds threatening the porch? Shade trees can make the porch a cool oasis, but the branches of a nearby tree rubbing on the roof, gutters or wood trim often will cause damage. Tree roots may destabilize porch foundations or supports. Bushes growing against the porch and not trimmed back on a regular basis may block wood porch components from drying breezes, thereby letting moisture build up in the woodwork. Flowerbeds and mulch around the porch that are not properly sloped downward in a grade away from the house will promote moisture problems.

Defining the Scope of Work

Once the historical and physical assessments are complete, it is important to define the scope of work. How much and what kind of work will need to be done to make the porch structurally sound while preserving its historic character, or to recover its historic appearance if portions are extensively deteriorated, altered or missing? Any part of the porch that defines its historic character should be repaired or replaced to match. Since the porch may display varied levels of deterioration, the spectrum of work in one project

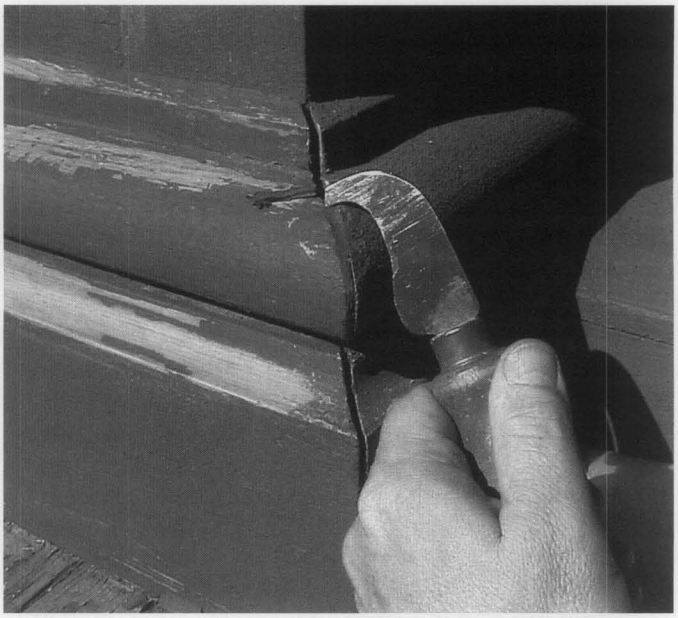


Figure 7. Common problems with porches that can contribute to serious wood decay include cracks in woodwork and joints that have opened up. Both provide an easy path for water seepage. Trapped moisture can foster peeling paint, wood decay and insect infestation. Open joints and cracks should be checked for evidence of more serious decay and marked for caulking or repair. Photo: John Leeke.

can include maintenance, repair, and replacement. When laying out the scope of work for the project, each individual component and decorative element of the porch should be identified, and linked with the work needed for that item.

Undertaking the Work

The highlighted work approaches in this section are based on *The Secretary of the Interior's Standards for the Treatment of Historic Properties* and the *Accompanying Guidelines for Rehabilitating Historic Buildings*. The *Standards and Guidelines* provide a sound philosophical and practical framework for achieving the highest retention of historic materials and character possible. Thus, the familiar hierarchy is applied: maintain, repair, and then replace only if necessary. Contemporary alterations are discussed in a separate section.

Preservation and Maintenance

There are a variety of tasks that can be done on a regular basis to extend the life of a porch. In addition, a visual inspection of the porch should be made every spring and fall to determine if more in-depth repairs are necessary. Fortunately, ongoing maintenance significantly reduces both the need and cost for later repair work and represents good preservation practice. When properly maintained, a well-constructed porch can last for decades.

Routine Cleaning and Other Surface Work
Since many porches are essentially another living space,

extending housekeeping to this space makes practical sense. Regular maintenance includes sweeping the wood porch decking, and, if needed, an occasional damp mopping. Removing dirt and leaves by sweeping is preferable to frequent hosing off the deck with water. The latter can saturate the woodwork, thereby promoting decay. Frequent sweeping will reduce the accumulation of abrasive materials, such as dirt and sand. While visually pleasing to some, vines and plants should be kept trimmed away and not be trained to grow onto or allowed to grow beneath porches. Plants and vines unfortunately reduce ventilation, promote a moist environment for insects and decay, accelerate open wood joints and impede cyclical maintenance. As an alternative, traditional freestanding trellises can be used to support plant growth away from the porch.

There are certain precautions that are recommended for wood floors. Rubber mats, rugs or indoor/outdoor carpeting can trap moisture and condensation on their underneath side and should not be used on a wooden porch floor. Keeping flower pots up off the wooden deck will help prevent moisture buildup and decayed spots – wood, clay or metal "trivets" that hold the pots an inch or more off the wooden deck are helpful, but the pots should be moved to different locations periodically. In colder climates, light snow can be swept off the porch. Snow shovels with a hard rubber leading edge or plastic shovels cause less damage to wood than metal, while paint in good condition helps ice to release more easily. Sand or clean kitty litter can be sprinkled on ice to prevent slipping; however, they should be later swept off the porch, as they are abrasive. Salt (sodium chloride) is not recommended for ice removal on older porches as it can promote corrosion and failure of nails and other fasteners. Magnesium chloride is an alternate de-icing salt that is less corrosive and less damaging to masonry and plants. If any de-icing salt is used, be sure to scrub and rinse off the porch deck in the spring. Boot scrapers and brush-mats at the bottom of the stairs are recommended for muddy areas.

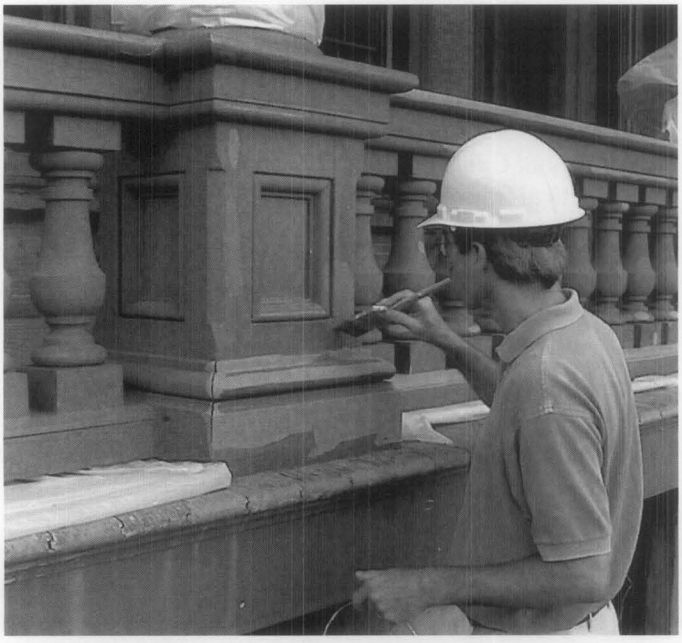


Figure 8. Decay can start when wood is left exposed to the weather or where joints open up. An inexpensive way to extend the life of the existing porch paint without jeopardizing the historic material is spot paint and caulk where needed every year or two. This cost-effective procedure is particularly effective in maintaining wood porches where the exposure to weathering is high. Photo: John Leeke.

Painting

Spot painting and resealing of open joints should be undertaken at least every other year (Fig. 8). Heavily used stair treads may require more frequent paint touchup. When peeling paint or bare wood is evident, inspect to ensure it is not signaling deeper problems, such as decay. With sound wood, scrape off the loose paint, sand, prime, and repaint the area. Where lead paint is present, appropriate lead hazard precautions and procedures apply. Only top-quality exterior primers and paints are recommended, selecting for the deck and stairs specially formulated paints. Where wood porch steps are exposed to moisture, grit added to the wet paint during application will help improve safety.

Repair

Many repairs may be successfully undertaken by property owners, while major projects often require the special knowledge and equipment of an experienced contractor. Repairs generally include patching and reinforcement of historic materials. The roof and foundation are particularly important to the preservation and the structure of a historic porch yet they often receive much less attention than ornamental features. Their neglect will usually lead to more costly work. Repairs to features such as a balustrade or flooring can encompass limited replacement in kind when the porch part is severely deteriorated or when a part of a repeated feature is missing altogether. Some common porch repairs are discussed in this section.

Filling Open Cracks or Joints

To seal open cracks or joints, start by scraping off the paint back a few inches from the opening and removing old caulk to expose bare wood. The opening should be examined for any signs of wood decay, and to determine if the joint is loose due to a loss of connection, such as rusted nails. After correcting any problems, apply a water-repellant wood preservative that can be painted. Such preservatives are either an oil-based or waterborne solution of oils or waxes with mildewcide, fungicide and pesticide added. Then apply a high quality exterior wood primer to the wood surfaces where a sealant or caulk is to be used. Most open cracks or joints then can be filled with a sealant or caulk, while larger ones may need the addition of a backer rod. In some cases, small metal flashing over the crack or open joint may be more effective and longer lasting but, when used, care should be taken with proper installation. The final step is painting.

Patching with a Dutchman Repair
This traditional technique is often used to repair localized cases of decayed wood and, when undertaken with skill and care, will serve as a permanent repair (Fig. 9). If the damaged area has a structural function, temporary bracing or other support will be necessary. Otherwise the first step after removing any paint around the damaged area is to chisel or mechanically remove the decayed wood. It is best to use the same type of wood being replaced and the new or recycled wood should be seasoned to avoid shrinkage. The repair procedure involves cutting a piece of wood, called a *dutchman*, slightly larger than the area of damage that has been cut out. The dutchman then is laid over the damaged area and an outline scribed into the original wood surface below. Next, a chisel or router is used to follow the scribed line to form an opening in the existing wood for the new piece. As a preventive measure, an appropriate fungicide should be applied to the surrounding old wood and allowed to dry. The dutchman is then glued into place with waterproof adhesive, such as an epoxy formulated for wood. The repair is finished by trimming or sanding the surface of the new wood down flush with the surrounding existing surfaces, priming and painting.

Figure 9. The ends of porch roof rafters are often susceptible to moisture decay. When concealed by a soffit or ceiling, rafters can be repaired by adding new sister boards. Where roof rafter ends are exposed, splicing new wood onto the old (dutchman repair) and use of epoxy consolidants and fillers both preserve sound historic fabric while retaining the historic appearance. Photo: Paul Marlowe, Marlowe Restorations.

Patching with Epoxy or Wood Fillers
There are a variety of commercial wood fillers. Cellulose based fillers consist of wood fiber and a binder and have been available in stores for many years. Only those suitable for exterior applications should be used and they will require a protective finish. Epoxies are a more contemporary product, commonly used by experienced contractors and woodworkers. Epoxies are petroleum-based resins created by mixing two components in accurate proportions that result in a chemical reaction. The result is durable, moisture-resistant consolidants and fillers that bonds tenaciously with wood, and can be sawn, nailed or sanded. Epoxies are for use only in areas that will be painted, as they do not take stain and deteriorate under sunlight. Since epoxies are more difficult to work with than other wood fillers, experience working with epoxies is needed for successful repairs.

Repairing Railings and Balustrades
Balustrades and railings are not only practical and safety features, they typically are highly visible decorative elements. Unfortunately, balustrades and balusters are frequently altered, covered, removed or completely replaced even though in most cases they can be repaired in a cost-effective manner. To preserve historic fabric, the repair of old balustrades and railings is always the preferred approach. A broken baluster usually is one in need of repair, not replacement.

Loose railings and balustrades present unsafe conditions and need to be repaired as soon as possible. Start by examining the points of attachment to determine exactly why the railing or balustrade is loose. Common reasons include rusted fasteners, decayed wood, or physical stress that has broken the fasteners or split the wood. Paint and decayed wood must be removed. Where fasteners are broken yet the wood is sound, the balustrade can be re-fastened using hot-dipped galvanized or stainless steel nails or screws, setting the heads of the fasteners below the surface of the wood and using a wood filler to cover and seal. Next repair deteriorated wood by using a dutchman or wood-epoxy repair. The repaired joints then can be sealed and painted.

Replacing Missing Balusters
The balusters help comprise a wood balustrade and come in three general styles: simple rectangular shape; flat, pattern-sawn (usually a board with some decorative edge or cutout); and turned. It may be necessary to replace certain balusters that are beyond repair or missing altogether. Some are easy to replace with new matching balusters while others can be more challenging in terms of both design and costs. Finding or affording replacement balusters may take time since they should match the historic baluster as closely as possible. In the meantime, unsafe balustrades can be temporarily stabilized, introducing temporary new material that soon will be replaced.

In replacing individual balusters, simple, rectangular balusters should not be replaced with pattern-sawn or turned ones unless physical or pictorial evidence survives which indicate they previously existed historically on that particular porch. Such an alteration can change the historic appearance of the porch or be incompatible with the character of the building.

Determine the size and shape of the missing balusters either by examining adjacent ones or temporarily removing an existing baluster as a sample. Heavy paint buildup should be removed so that the original dimension can be established. Scrape and clean the joint locations and make repairs to any deteriorated areas. A new baluster is then fabricated to match the original in design and material, either on site or by taking a drawing or sample to a local woodworking shop. The new baluster should be made one-half inch longer than needed on both ends. Measurements are taken from the bottom surface of the top rail to top surface of the bottom rail. Joints on the new baluster can be laid out with a pencil, using a sliding bevel to transfer any angles, and the new baluster trimmed to fit with a handsaw. After test fitting, the ends and any exposed end-grain of the baluster need to be sealed with a high-grade primer or epoxy. Next, apply a paintable water-repellant coating to all exposed wood surfaces, and apply a primer. The baluster can then be fastened in place with hot-dipped galvanized or stainless steel nails, and the nails set. Finally, seal joints and fastener holes and paint the baluster.

Repairing Column Plinths and Bases

Columns not only enrich the historic character of the porch, they provide support for the roof structure above. Because of their detail and complex construction they can be costly to repair or replace, making maintenance and minor repairs important. Column plinths and bases tend to deteriorate because of their exposed location on the outer edge of a porch (Fig. 10). Leaking gutters can result in water draining into the entablature and down into hollow columns, while clogged or capped gutters can allow water to pour down and splash back onto the column bases. Open joints and limited wood decay can be repaired using methods previously discussed. Column repairs usually are undertaken by an experienced carpenter, since it may involve structural support of the roof above.

Repairing Floorboards and Ceiling Boards

Floors should slope down toward the outer porch edge for proper drainage. If drainage is inadequate, moisture buildup will cause deterioration of the floorboards. Flooring can also deteriorate due to movement in the supporting structure below. If a floorboard is soft or broken, the extent of decayed or split wood can be determined by probing gently with an awl. The existing floorboard can then be removed, cutting the length if needed so that the end will center on the next nearest joist or girder. Once the board has been removed, the structural framing beneath should be examined for deterioration and to ensure it is sound. A new floorboard is then cut to length, and the outer edge shaped to match the adjacent boards. After priming the replacement board, nail it in place and repaint.

If a section of the ceiling is deteriorating, it is likely that there is a roof or gutter problem. To determine the cause of deterioration, inspect the ceiling, gutters and roof, including the internal roof structure. After making necessary repairs, the ceiling boards can be repaired in much the same manner as a deteriorated floorboard.

Repairing the Porch Roof and Gutters

With roof leaks, the entire porch is at risk. Leaks can promote decay in roof rafters, ceiling joists, and columns as well as in areas more easily to detect such as the ceiling and fascia. Inspect the roof covering, gutters and flashing for deterioration and improper performance. They can then be repaired or replaced, as needed, to keep water out of the structure. Avoid having the gutters and downspouts on the main roof drain onto a porch roof.

Repairing the Foundation

Unstable foundation supports can cause serious damage

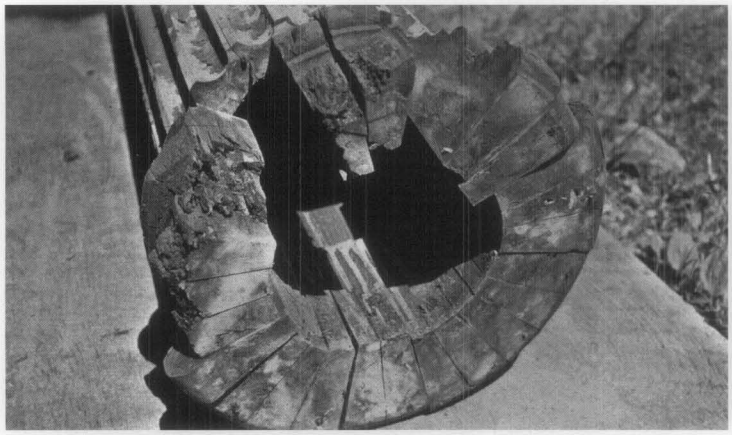


Figure 10. This nineteenth century porch column is made of wood staves, similar to the way a wood barrel is put together. After replacing the torus and making dutchman repairs to the apophyge along the base, the column and pedestal are ready to be reinstalled on the porch. Photos: NPS files.

to a historic porch. There are numerous causes and solutions. If the posts supporting the porch deck rest on stones or brick set directly on the ground, there can be seasonal shifts due to the changing moisture content of the soil or freeze/thaw conditions that will require regular attention. Under certain conditions, it may be advisable to extend footings for the posts below the frost line. Where moisture problems exist, improved drainage may be necessary. It is not uncommon to find that masonry joints in the foundation wall or piers have deteriorated as a result of rising damp, where moisture from the soil percolates up through mortar joints. This condition may lead to the eventual breakdown of the mortar and even old brick and soft stone. In such cases, it will be necessary to replace the areas of damaged masonry and repoint the mortar joints.

With wooden posts, insect damage or rot may necessitate corrective measures to strengthen the foundation. Techniques can include one or more of the following: epoxy consolidation; dutchman repair; or the addition of supplemental supports to the foundation posts and joists. In some cases damage may be extensive enough that the only real solution is rebuilding the foundation.

Repairing a Porch Apron
The apron, skirt, or latticework is a highly visible and functional porch feature. An apron keeps animals out from under the porch, while at the same time allowing air to circulate, preventing unwanted moisture buildup. Aprons typically are made up of a wood frame, surrounding either a simple lattice or a repetitive pattern of decorative sawn boards. Because the frame is so close to the ground, decay is common. Other causes of decay include plantings around the house that are growing too close to the latticework and improper water drainage. An apron may require partial or complete disassembly for proper repair. One or more of the apron frames should either be hinged or secured with turn buttons for easy access to under a porch for inspection and maintenance.

Replacement

When individual porch parts are deteriorated beyond the point of repair or missing altogether, replacement is necessary. To retain the historic character of the porch, the replacement parts should match the historic component as closely as possible in material, design, color, texture, and other qualities. To achieve this, existing evidence of the historic design, such as a baluster or column detail, or a tongue and groove floor design, should serve as a pattern for the replacement part. When replacing an element, it may provide a good opportunity to upgrade the wood to another species that is more decay resistant, or to one with a vertical grain that is more resistant to cupping or splintering. In limited cases, it may be appropriate to use a substitute material for the replacement material as long as it conveys a close visual match. Before replacing a deteriorated historic porch component, it is important to understand how it was constructed and installed, and what lead to its deterioration. If the replacement part does not sufficiently match the historic part, the character of the porch may be diminished, or even lost. If the cause of material failure is not addressed, the replacement will also fail.

Replacing Porch Floorboards
If a large section of the porch floorboards is deteriorated, the framing beneath may also be damaged and should be assessed. Replacing floorboards can often expand into repairing the structural sills, girders, and joists beneath. Complete floor replacement will likely require the removal of floorboards that are under structural posts or columns. This may necessitate the careful stabilizing in place or the removal of the posts or columns and the installation of temporary support for the roof structure. If the floor failure was caused by inferior wood, the wood quality can be improved at this time. However, the new wood flooring should match the existing in thickness, width, shape and texture. The slope of the floor should be maintained, or a slope may need to be created if none exists. A slope of ¼ inch per foot or greater, away from the house, is needed for adequate drainage. Boards are usually laid in the direction of the slope, sloping down to the outer edge of the floor.

Replacing Steps
Porch stairs receive heavy usage and are close to the ground, making them predictable candidates for deterioration. Stairs should be repaired or, if necessary, replaced by an experienced carpenter who understands the safety codes and is experienced in fabricating custom stair parts to match original detailing without depending only on store-bought parts.

Replacing Column Plinths and Bases, or Entire Columns
When plinths and bases are deteriorated beyond repair, they can be replaced without replacing the column shaft, which may still be in good condition or require only minor repairs at the bottom. Such replacement will involve temporary shoring for the roof. One-story columns and shafts are often more easily removed during this work, while taller columns are sometimes supported in place. If only a few plinths or bases are deteriorated, it is often economical to have new ones made of wood to match. If numerous plinths and bases are deteriorated, replacing with bases made of rot-resistant materials can make economic sense; however, care must be taken to ensure that all the visual qualities including design, size, shape, color and texture of the historic part are matched (Fig. 11).

Entire columns may need to be replaced, but an owner should first consider all repair alternatives. Some contractors routinely recommend complete replacement of one or all columns due to the challenge of a clean repair (particularly with stave-built columns), or because they see the potential for more profit in complete replacement. If a contractor recommends complete

Figure 11. The lower shaft of the porch columns had decayed as water wicked up through the end grain (top). The column shafts were repaired in place by cutting out the deteriorated wood and making repairs using epoxy consolidants and fillers. (bottom). The column bases were replaced. Photos: Paul Marlowe, Marlowe Restorations.

replacement, other opinions should be sought to ensure repair is truly not feasible. Preserving the historic appearance of old columns is not the same as preserving historic columns.

Where a replacement turned or staved column is needed, a local millwork may be able to match the profile or pattern. Alternatively, the Internet is helpful in identifying potential sources of replacement columns that can match the appearance of the remaining ones.

Replacement Materials

Wood

When selective replacement is necessary, the key to success is the selection of suitable wood. Dimensional stability, decay resistance and paint holding ability are wood characteristics that effect durability. Wood that expands and shrinks too much can cause paint to crack. Substances found naturally in certain kinds of wood repel fungi and insects that destroy wood. Selecting wood that is relatively stable and naturally decay resistant helps avoid problems.

The wood from trees cut one and two centuries ago was much different than most wood available today. The mature trees in older forests grew very slowly and, as a result, the annual growth rings were very close together. Today, trees grown by commercial companies for their lumber are fast growing so they can be harvested sooner. As a result, commercially farmed trees have annual growth rings much further apart, resulting in the cut lumber being less strong and decay resistant than older timber. These differences in quality are one of the reasons it makes sense to save old wood when possible.

Wood Selection: When choosing wood for repair and replacement work, the species, grade, grain and environmental impacts should be taken into consideration. This is especially applicable to historic porches because of their high exposure to the weather and vulnerability to decay. The best species are those with good natural resistance to decay, such as redwood, cypress, cedar or fir. A clear (knot free) grade of wood is best; however, if clear wood is not readily available or too expensive, a grade with small or tight knots is acceptable. Finally, the use of more stable vertical grain lumber is preferable to flat grain boards. Vertical grain lumber expands and contracts less with changes in moisture content, resulting in reduce warping and checks. Paint thus will hold better. The downside to using vertical grain boards is the cost, which tends to be as much as two to three times the price of flat grain lumber in the same grade and species. However, this expense is typically recovered through lower maintenance costs over the years. Thus, a decay-resistant, high-grade, vertical grain lumber is the best choice for the replacement of deteriorated porch elements, particularly flooring, stairs and milled elements such as balusters and moldings.

The best species to choose will vary depending on the region the house is located. For example, in the South, cypress is more available, making it the selection of choice in the region. Because of this wood's relative ease with which a carpenter can shape it, cypress is a good choice for replacing brackets and trim boards on a porch. In contrast, vertical grain Douglas fir is less workable, but is a very good choice for the replacement of porch floorboards in most climates. Although Douglas fir is from the Northwest, it is generally available throughout the country. For most protected trim boards on porches, white pine is a good choice as it is easy to work and is moderately decay resistant, especially if the wood is back-primed before installation. Availability of any specific wood will change annually based on market supply and demand.

Wood Characteristics

Species	Cut or Grade	Cost	Workability	Resistance to Decay	Resistance to Cupping	Paint Holding Ability
Redwood	Clear, Vertical-grain, all-heart	$$$	Fair	Excellent	Excellent	Excellent
	"B" Select, flat-grain	$$	Fair	Excellent	Good	Good
Cedar	Clear	$$	Fair	Excellent	Good	Fair
Cypress	Clear	$$	Fair	Excellent	Fair	Good
Douglas Fir	"C" & better, Vertical-grain	$$	Fair to Poor	Good to Fair	Excellent	Fair
Southern Yellow Pine	"D" Select, flat-grain	$	Fair	Fair	Good	Fair
	Vertical-grain	$$$	Fair	Fair	Excellent	Fair to Good
Eastern White Pine	"D" Select, flat-grain	$	Excellent	Fair	Excellent	Good
	Vertical-grain	$$$	Excellent	Fair	Good	Excellent
Poplar	Firsts and Seconds	$	Good	Poor	Good	Fair
American Mahogany	Clear	$$$	Excellent	Excellent	Excellent	Good

This table summarizes the characteristics of just a few of the different species available, including the workability of the wood (indicating a better wood for decorative porch pieces), the resistance to decay (an important feature for all porch components), resistance to cupping (a wood highly resistant to cupping is a better choice for floor board replacement) and paint holding ability. The Cut or Grade is also listed, as a low-grade wood can perform very differently than a higher grade in the same species. Cost will vary depending on region and market supply and demand. In general, it is best to contact two or three local lumberyards to find the available woods with the characteristics needed in the local market. Source: Practical Restoration Report, Exterior Woodwork Details.

Chemically Treated Wood: Chemical wood preservative treatments are available to resist insect and fungal attack, but care should be taken to avoid using ones that may cause environmental or health risks. Borate preservatives can be applied to surfaces or injected to penetrate and protect the entire volume of the wood. Preservatives with zinc napthenate can be applied to the wood surface, where necessary, especially to protect hidden joinery and the end grains of wood. Water-repellants can also be used to help seal out moisture. Finally, primers and paints should be applied to both protect the wood and to maintain the historic character of the porch. Note that these treatments are different than those used on most pressure-treated wood, which is typically a plantation-grown southern pine of lower quality that is impregnated with chemicals. Pressure-treated lumber can be effective when used for hidden structural members like posts, joists and sills. However, because typical pressure-treated wood is very susceptible to the deterioration of checks, warping and splitting, especially when left unpainted, it is not a good substitute for the better quality wood that is needed for visible finish porch parts.

Stock Components

For over a century, prefabricated architectural parts have been sold through catalogues or at home improvement stores. Some companies still make generic, stock architectural components in the same general sizes and designs as those that were first manufactured. These components can be available in both wood and substitute materials. Thus, it may be possible to replace a historic stock component, such as an architectural grade column, with a new prefabricated column that matches the original. Unfortunately, these replacement parts are not designed to match the historic parts of any particular porch. Because traditionally there were many different porch elements, a wide range of styles and considerable regional variations, stock replacement parts available today are not often found to match what is needed in a specific porch repair project. When faced with deterioration of a few porch parts, all the historic material should not be removed in favor of a readily available stock design that does not match the historic appearance. The expressed goal may be to create a porch with a "consistent look," but this approach diminishes the building's historic character and authenticity.

Figure 12. This old porch enclosure, located on the back side of a house, has acquired significance over time and is remarkable both in the appropriateness of its detailing for use by others today, as well as its high degree of maintenance. The enclosure is set behind the columns; the balustrade has been retained; and the light divisions and the size of the glass panes echo that of the windows above. Within each bay there are two well-crafted, inward swinging doors, providing for greater seasonal use of the porch. Photos: Charles Fisher.

Plastic and Composites

A variety of modern materials are marketed today as a substitute for wood. They are usually composite materials typically in the form of plastic resins, including vinyl (PVC), fiber-reinforced polymers and polyester resin. There are other products on the market as well, including medium density wood fiberboard and composite fiber-cement boards. The market is ever changing with the introduction of new synthetic materials and the re-formulation of existing ones. The more costly synthetic products tend to offer the best potential for matching historic features while offering good durability. This means that potential cost savings over new wood tends to be more long term than immediate. Such products generally are not carried in local home improvement stores but rather are available from building supply companies or direct through catalog sales.

The historical significance of a particular property and its porch influences decisions regarding possible use of substitute materials. In general, greater emphasis is placed on authenticity and material integrity when maintaining and repairing individually significant historic properties. However, a front porch that is repeated on rowhouses may be one of the defining characteristics of the historic district and thus of importance to the entire streetscape. So, too, can the location and appearance of a porch influence material decisions, as with, for example, a prominent front porch with ornate detailing as opposed to a small porch over a rear door.

Thus, when the historic porch contributes to the historic character of a building, the particular substitute material that is being considered should accurately match the appearance of the wooden feature being replaced. Composite materials that can be routed or shaped in the field to match specific pieces being replaced have greater potential for use in repairing a historic porch. Materials that cannot be shaped to match the visual appearance of the historic pieces being replaced usually are not suitable for use on historic buildings.

Substitute materials need to be finished to match the appearance of the historic elements being replaced. In nearly all cases, this means that the material should be painted, or where historically appropriate, stained as with some porch ceilings. While there are substitute materials being marketed as pre-finished with either a plain flat surface or generic wood-grain texture, select those that can be painted or stained in the field.

When a substitute material is to be used in conjunction with existing or new wood material, it is important to consider the differences in expansion and contraction due to temperature and moisture changes. Before making a decision, it is also important to understand how a particular substitute material will age, what its maintenance requirements are, and how the material will deteriorate. For example, sunlight can break down exposed surfaces of plastic resins, so painting the surfaces is needed just as with wood. Low and medium density plastic foam parts are easily damaged by abrasion and physical damage, exposing the interior foam to weathering.

Wood porches are just that, porches made out of wood, just as a brick houses are made of brick and cast-iron porches are made of cast-iron. The type of materials used historically in the construction of a building helps define its character. Limited use of substitute materials that closely match missing or deteriorated features may not endanger this historic character, but wholesale replacement with substitute materials usually will.

Considerations for Contemporary Alterations

Enclosures

Much of the character of a historic open porch is clearly its openness. Therefore, in most cases, a historic open porch should not be enclosed. If a porch enclosure is being considered, its significance and location—as well as the nature of the planned enclosure—play key roles in whether it can be done without changing the porch's and building's historic character. While it is almost never appropriate to enclose a front porch on a historic building to create interior space, enclosing a less prominent porch on a less visible elevation could have less impact. In addition, an enclosure should retain as many of the historic porch features as possible (Fig 12).

Insect Screening and Awnings

Traditionally, the seasonal use of porches was extended with screens and awnings. Screened porches have been popular since the advent of inexpensive and durable wire insect screening in late 1800s. Screens were often set unobtrusively behind railings and columns so the decorative components of the porch remained prominent and visible. Since screens can be damaged easily, the screening material was often set in slender, easy to repair, removable wood frames that could be installed during the warmer months, and stored in the winter. When screening a porch today, this historic precedent is recommended. Screened panels should have minimal wood framework painted either to match the porch or in a darker color to make the framing less visible. Decisions on whether screens should be installed inside the porch railings and posts, between the posts, or on the outside will depend on local traditions and on the design of the porch and trim. Screen doors on porches should be sized to fit proportionately with the porch, made of wood, and hung to swing out so insects are not brought inside with use.

Awnings, drop curtains, and valances were common porch accessories during the nineteenth and well into the twentieth centuries. Both functional and decorative, these canvas features helped shield porches from the sun's direct rays, while their colorful stripes embellished and complemented the house's exterior. Some awnings were fixed in place; others were of a roller assembly that allowed owners to easily lower or retract the awning, depending on weather conditions.

Today, modern solution-dyed acrylic fabrics—materials that resemble, but are more durable than canvas—are often used on porch awnings and drop curtains. When new awnings are installed on a historic porch, the selected awning should be appropriate in shape, material, size and color. Care should be used not to damage existing historic porch features such as columns or cornices.

Temporary Enclosures

Temporary enclosures allow a porch to be used in colder months while not permanently altering its appearance. In fact some have become historic features of buildings. Particularly in New England, there is a continuing tradition of installing relatively substantial glass and wood panels on porches during the winter, especially around an entrance door. These tended to have small divided lights. Sometimes porches were fully enclosed with a divided light glass door for entry, creating an enclosed vestibule that reduced the amount of cold air entering the house when the door was opened. Others consisted of simple sidewalls perpendicular to an existing entrance door, serving as a windbreak. Such enclosures were generally removed in the spring (Fig. 13).

In recent years, some porches have been enclosed during the winter with plastic sheeting (polyvinyl) for perceived energy conservation or for creation of an enclosed space. Such a treatment generally diminishes a building's historic character and is not recommended for highly visible porches.

New Permanent Enclosures

Enclosure of a historic porch can result in significant changes in the appearance and character of the building. When considering the possible enclosure of a porch, a number of questions and concerns should be successfully addressed.

Is the porch on a significant elevation of the building?
A porch on a prominent elevation was there to be seen and its open qualities are visually important. Enclosing such a space should be avoided.

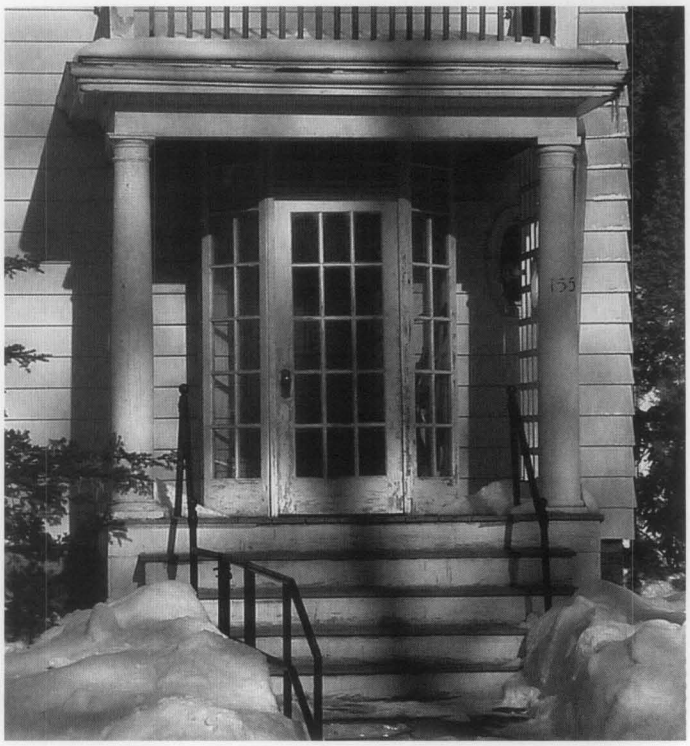


Figure 13. Particularly in New England, there is a cold weather tradition of installing temporary glass and wood panels at entrance doors, thereby creating an enclosed vestibule. These enclosures with their small divided lights were generally removed in the spring. Photo: John Leeke.

Figure 14. The enclosure of a prominent porch can dramatically change the historic character of a building. The L-shaped porch on this 1896 Shingle-style New England residence was later enclosed with aluminum windows and screens. Recent owners elected to reopen the historic porch. Among the other work, it was necessary to correct structural damage, as with this post, where beneath the wood casing carpenter ants had done serious damage. In reopening the porch, the historic character of the residence has been brought back and the traditional use of the porch is once again enjoyed. Photos: Mark Landry, Landmark Services.

Is the enclosure necessary? An enclosure will undoubtedly change the porch as a historic feature and may result in damage or loss of historic materials. Depending on the significance of the porch and the nature of the building, a new porch enclosure may also change the historic character of the building. Consideration should be given to alternate solutions such as recapturing underutilized space in an attic or basement (Fig 14).

Is the porch a highly distinctive feature of the building? Even porches on secondary and rear elevations can be distinctive, such as a two-story porch on the side ell of a farmhouse. Porches ornamented with decorative trim that embellishes the house can also be distinctive. Enclosing these features should also be avoided whenever possible.

Is the porch a feature repeated on a row of buildings in a historic district? Open front porches on a block of row houses can be not only important to an individual building but can also make up a significant feature of the streetscape. Enclosing such a porch usually is inappropriate even if a porch on an adjacent building already has been enclosed.

Will the proposed enclosure encompass the entire porch? History has shown that the enclosure of a portion of a porch on a secondary elevation does not always alter the character of a building. In the past as indoor plumbing was introduced to old buildings, the partial enclosure of a one or two-story porch on a secondary elevation was a convenient means of providing new bathroom space while limiting disruption to the building's interior. Since early bathrooms were traditionally small in size, most of the existing porch could be retained as open space. It was common to create new walls set either between columns or behind them, since the columns usually served a structural as well as decorative purpose. Where sleeping porches with full-length louver shutters were present, the new wall could simply be set behind and the shutters retained and fixed in place. In both cases the resulting effect minimized the impact of the partial enclosure on the appearance of the building. This also provides us with an approach that may be appropriate for a particular project today.

Will the enclosure result in the loss of considerable historic fabric? Unless the historic porch is so deteriorated that it is beyond repair, any consideration of enclosing all or part of a porch should incorporate retention of historic fabric. This may mean that the existing structural system needs to be augmented but generally not replaced. Distinctive features such as columns, brackets and balustrades should be retained and the new wall set behind them.

Is the foundation adequate for the enclosure of the porch and the new use of the space? Porches were often built on simple posts or piers, some with only minimum footings. Such structural supports may be inadequate to carry the added load of the proposed changes and the typical low space beneath a first floor porch may make installing a new porch foundation difficult and expensive. Such installations may result also in an extensive loss of historic fabric.

How will the proposed enclosure be viewed from the outside once the interior space is furnished? One of the approaches to enclosing a porch is to utilize near full glazing set behind existing columns in an attempt to retain a feeling of transparency. Whether such a treatment is successful depends on how it will look once it is constructed and how will the appearance on the outside be impacted by interior lighting,

mechanical systems and furnishings. The traditional use of plantings and porch awnings for shade also provided extended privacy. If historically appropriate, an existing or new awning and plantings may help to reduce the impact of a porch enclosure on a secondary but visible elevation.

Is the design of the proposed porch enclosure in keeping with the historic character of the building? Where the enclosure of all or part of a historic porch is appropriate, the selection of a compatible design and materials is important. Windows, doors, and wall material selection, along with how the new infill fits within the existing porch, are all factors to consider. A traditional technique of porch enclosures still used today involves the insertion in each column bay of one or more glass enclosures set in wood frames. The enclosures are located between or behind the columns, depending upon the nature of the porch, and mimic the pattern or size of glass panes found in historic windows on the building (Fig 15). An alternate treatment involves the use of much larger sheets of clear, non-reflective glass recessed behind the porch supports, balustrade and railing. This more contemporary treatment may be appropriate, depending upon the historic character of the building, location of the porch, and other factors (Fig 16). Windows, doors, and wall material selection, along with how the new infill fits within the existing porch, are all factors to consider.

Safety and Building Codes

There are many building codes used by states and municipalities across the nation, with a majority of their requirements being very similar and focused on new construction. Building codes such as the International

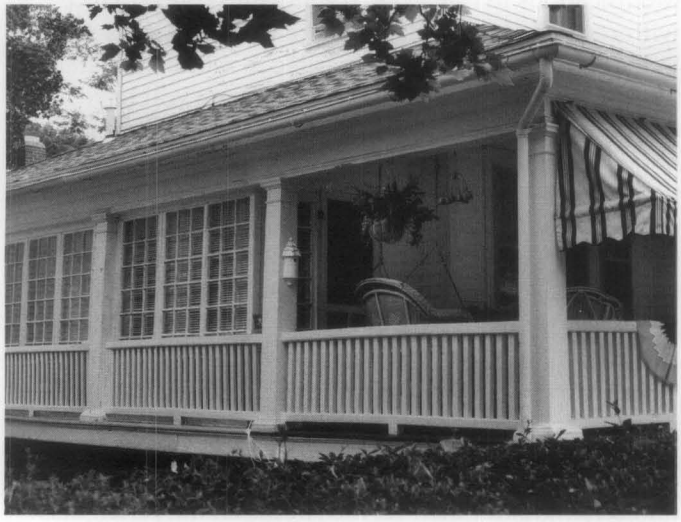


Figure 15. A traditional technique of porch enclosures still used today involves the insertion in each column bay of one or more glass enclosures set in wood frames. This enclosure is properly set back an entire porch bay from the front of the house and utilizes traditional light divisions and wood frames. The balustrade, added here for illustration purposes, shows the importance of retaining this linear feature within the enclosed bays. Photo: Charles Fisher.

Figure 16. The use of near full glazing to enclose a porch may be appropriate depending upon the historic character of the building, location of the porch, how the interior space is to be treated, and other factors. This enclosure of a rear porch to create a conference room successfully utilizes large expanses of glass and narrow metal framing set behind existing porch elements (a through e). Where an additional horizontal support was needed (f), the frame was placed at a location that is found in many traditional insect screen enclosures. Photo: Charles Fisher.

Building Code and its companion, the International Existing Building Code, have been developed in recent years that are generally much more sensitive to existing and historic buildings, emphasizing the retention of historic fabric without jeopardizing life safety. These "proportional codes," as they are called, allow building inspectors greater flexibility to make decisions based on the specific circumstances of each building, and the type and extent of work planned.

Successful rehabilitation work achieves a balance between building and safety code considerations and the retention of historic design and materials. The porch is no exception. The most common porch elements affected by code requirements are railing/balustrade height, baluster spacing, stair geometry, and structural system. When a historic porch is so deteriorated that a substantial portion must be replaced, modern building code requirements are usually triggered. These requirements are often more stringent for multi-family or commercial structures than single-family houses.

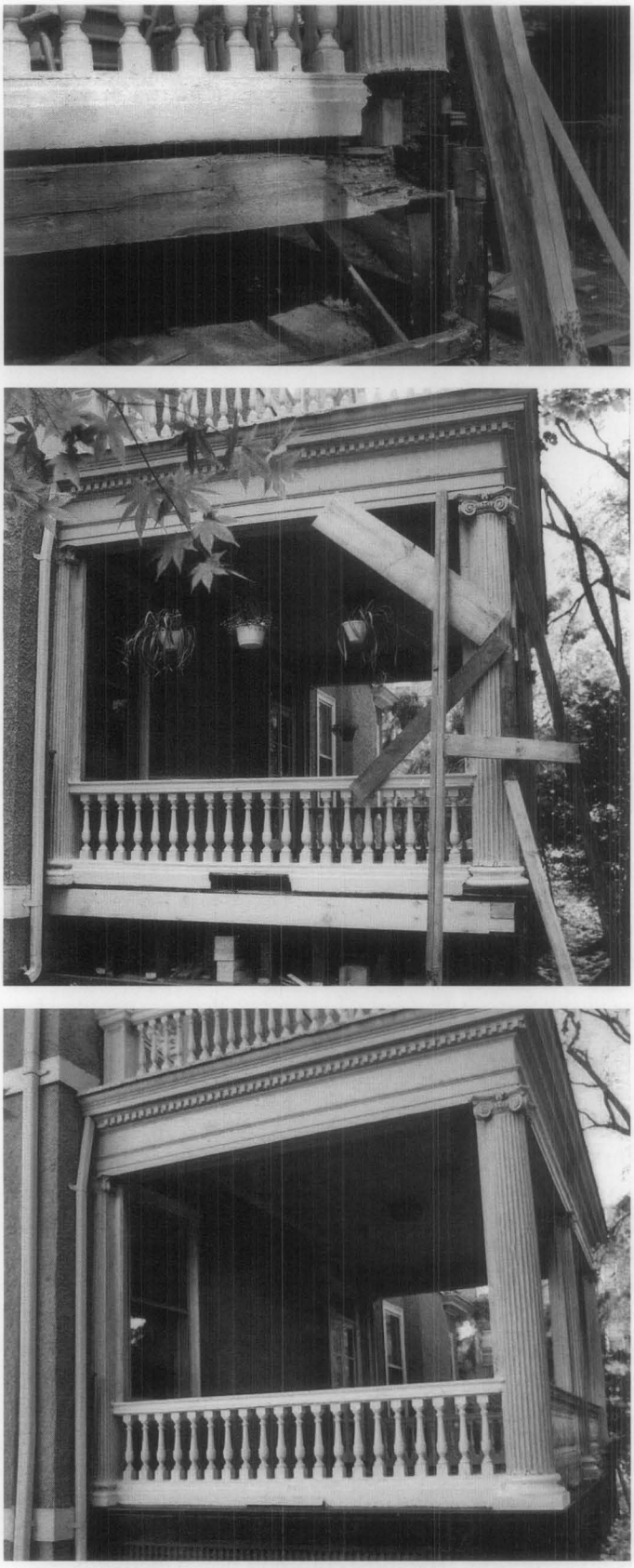


Figure 17. The porch's structural system must be capable of supporting today's loads. In this case moisture led to the deterioration of the wood girder at the corner, creating a major structural deficiency (top). A new solid timber was installed to replace the girder (middle); alternatively a built-up girder could have been used since a fascia board would conceal it. The column base was repaired and portions replaced and the balustrade and column reset and secured (bottom). Photos: Paul Marlowe, Marlowe Restorations.

It is important to ensure that the code-required work be done in a manner that is sympathetic to the historic character of the building. If building code requirements threaten the historic character of the porch, alternatives that reconcile the two should be explored. Many local jurisdictions issue waivers or variances for historic buildings, allowing for historic elements to be retained, when it can be demonstrated that safety will not be compromised.

In the event that an alteration to a historic porch is required to make the porch safe to use, care should be taken in planning and undertaking the work. Fortunately, there are usually a number of options that are possible, although one is usually the most appropriate preservation solution.

Structural Loads

Ensuring that the structure's foundation can support the specified load is a primary safety issue for porches. Fortunately, repairs and upgrades to improve structural stability are generally made to the foundation at or below grade, and can usually be concealed under the porch or behind finish details. Weakened joists can often be strengthened with the addition of sister joists, epoxy structural repair, or the insertion of new concealed structural members (Fig. 17).

Stairs

Historic stair risers are sometimes too steep and treads too shallow to meet contemporary building codes or the special needs of the occupants. In the latter case, the addition of a simple handrail that meets code may suffice. In instances where there is another stairway that meets code, for example a side stair, it may be possible to retain the existing non-conforming historic stairway.

Modifications to bring porch stairs into conformance with code can be difficult. Where buildings are set close to the street, it may not be possible to rebuild the stairs in the same direction to meet code if they will have to extend onto a public sidewalk. Unless a variance is obtained, it may be necessary to turn the stairs to be parallel rather than perpendicular to a building. Where wood stairs need to be rebuilt, the historic finish details, such as moldings, cut work and edge detailing, should be reflected in the new construction. One common mistake is the replacement of wood stairs or brick steps with concrete, a material that may not be in keeping with the historic building.

Where a porch must be used as a wheelchair accessible entrance, two general issues arise. If there is an elevation difference greater than ½- inch between the porch deck and the front door threshold, a simple threshold ramp may suffice. In cases where the elevation difference is larger than can be accommodated by a simple threshold ramp, a level platform with sufficient turning radius at the door for a wheelchair may be necessary. The other issue is devising a means for wheelchair access from the grade to the porch deck when the porch is the only

Figure 18. When a porch is used as a wheelchair accessible entrance, it may be possible to retain the historic stairs by adding a ramp parallel to the building. Through plantings and some re-grading, the new ramp built parallel to the building (left) allows retention of the historic stairs and does not impact the historic character of the entrance (right). Photo: Iowa State University Extension.

entrance alternative. It may be possible to retain the historic stairs by adding another entrance to the porch with the construction of a ramp parallel to the building (Fig. 18).

Baluster Spacing

Codes generally require for children's safety that new balusters are spaced such that a four-inch sphere cannot fit through. Vertical balusters on older porches are often spaced farther apart than this. If modifications are required, inserting narrow metal rods between the existing balusters may be a compatible and inconspicuous solution, particularly if painted flat black or another dark color. This is generally preferable to moving the balusters closer together or adding more balusters to fill the gaps.

Railing/Balustrade Heights

Historic porches generally have handrails that measure 28 to 30 inches in height from the floor. Current code requirements for new construction generally mandate that railings be 36 to 42 inches in height (often 36 inches for single family dwellings, and 42 inches for multi-family dwellings and commercial buildings). Raising the historic railing by as much as 30% or more can have a major impact on not just the proportions of the balusters, but also on the overall appearance of a historic porch. Adding a simple rail above the historic railing and painting it to hide its presence as much as possible is generally the least intrusive solution when this safety requirement must be met. Similarly, an existing bottom rail is sometimes set too high off the deck to meet contemporary code requirements. The addition of a simple wood rail or even a narrow metal pipe below the bottom rail will usually suffice (Fig 19).

It is not uncommon to find historic porches with decks only several steps off the ground and with no railings. For owner-occupied residences undergoing rehabilitation, local codes usually will not require the addition of railings to these existing porches, provided the porch deck is below a certain height off the ground—typically from 18 to 24 inches. Where greater safety is warranted even though no railing is required, alternatives such as planting an adjacent hedgerow, installing planter boxes between columns, or raising the grade are worth considering. Where not practical or acceptable, a railing might be added so as to not noticeably impact the appearance of the historic porch. Any solution, however, should be simple and based on the character of a specific porch, and its appropriateness considered on a case-by-case basis.

Figure 19. Historic porches generally have railings that measure 28 to 30 inches in height from the floor. When additional height is necessary for safety, a simple rail, added for illustration purposes in this photograph, can usually be installed above the historic railing. Not only does this treatment allow retention of the historic balustrade, but it also has a minimum impact to the appearance of the porch. Photo: Charles Fisher.

Conclusion

Wood porches have made an enduring contribution to our built environment. Porches are significant because of the special character they impart to a historic building and their role in our social and cultural history. A porch is an open sheltered part of a building, providing a covered entrance and, where larger, serving as an outdoor activity room. It represents an outward extension of a building, a place guests can initially be sheltered from the weather, even welcomed and entertained.

Like all historic building features, wood porches require routine maintenance to prevent decay. Understanding how a porch is put together and the factors that cause deterioration will help considerably in carrying out both maintenance and needed repairs. Regular maintenance pays off not only with a good appearance but also by reducing the need for future repairs. With both maintenance and repairs, emphasis should be placed on preserving the historic fabric and significant features of a porch. Where components are deteriorated beyond repair or missing altogether, new pieces should be installed that match the historic ones. Fortunately, good craftsmanship and the use of quality replacement materials as needed will be rewarded with repairs that last. Attentive care will result in the historic porch retaining its charm both in appearance and in function.

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