Full Report 2025

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Introduction

Researched by Nicolette Asselin and Clarendon Historical Society

Clarendon Heritage

Corpwell Foundation initiated the Clarendon Heritage Project to find a purpose for unused, salvageable historic buildings in Clarendon, VT.

Clarendon Heritage is dedicated to the study, appreciation, and preservation of Clarendon, VT.

We work in collaboration with the Clarendon Historical Society, the Preservation Trust of Vermont, the Division of Historic Preservation as well as others such as the Vermont Community Development Program.

Mission:

Our mission is to strengthen our community by protecting its significant cultural identity, heritage, and historical assets through educational programs, research, publications, preservation advocacy to maintain buildings, homes, landmarks, and archeology.

The endeavor is supported by Corpwell Foundation.

Why this project was selected by Corpwell Foundation?

1. **Why North Clarendon**
2. **Why the Chapel in North Clarendon**
3. **Significant Characterics**

1. North Clarendon

Clarendon is a unique rural town with much of the oldest history for the county. Most of it has been neglected and is disappearing slowly.

In the past, North Clarendon offered the most activities: A post office, a Grange, school, chapel, Inn, tea house. With grants and tax support, it could bring back a modest yet interesting historic village district for the Town Clarendon.

Stafford has received a similar Village Designation." *The classic Vermont village of our imagination – the church with a steeple, the smell of a freshly mowed town green flanked by mature maples and stone walls; a babbling brook, a nearby historic general store, post office, and an assortment of authentic historic homes – exists today in Strafford, Vermont."*

Obtaining the ***National Historical Registry*** for the North Clarendon Chapel (Chapel 1871) will hopefully pave the way to more community efforts.

Clarendon Springs has received a Village Designation, and North Clarendon would also be an ideal location for a Village Designation and the Agency of Community Development is encouraging the town to apply for the designation.

Village Designation Background

The Village Designation program supports the revitalization efforts of small and medium-sized historic centers. The designation brings financial incentives, training and technical assistance needed to attract vitality to Vermont's smaller communities.

The program was initiated by the Agency of Community Development.

Eligibility

Any Vermont town, city (except Burlington), incorporated village chartered to function as a general purpose unit of local government, or a consortium of such entities, is eligible for funding. However, the majority of projects are a coordinated effort between the municipalities, community groups and local or state non-profit organizations or small businesses.

Grant Types

Benefits

References:

Village Designation Program Guidelines

Resources from Historical Society of Clarendon

- 1910 North Clarendon
- 1912 North Clarendon
- North Clarendon Aerial
- Map of North Clarendon
- Crown Point Road

2. Chapel History

Built by Clarendon Baptists in 1871, on a 30'x45' lot (ref. 1980 Annual report).

The building is significant for its vernacular style and landmark for the village of North Clarendon. It displays rounded colored glass windows, a steeple and an open shingled belfry with a polygonal spire.

- **Area History**

State: This Chapel was built on the Crown Point Road Built in 1759. The route roughly followed an old Native American trail, paralleling the Black River in its southern extent and Otter Creek in its northern portion.

Local: The Town of Clarendon at that time was more significant in population than Rutland but much of the history has disappeared. The town had many districts and each one had a school. The 1869 map of Clarendon indicated there were 9 schools at that time, 1 for each district. That time frame corresponds nicely with the construction of the North Clarendon Chapel. In that timeframe, we find the Brick Church (1824), the Queen Anne East Clarendon Chapel and the Chippenhook Meetinghouse built in 1798 that burned in 1971.) The town has very few buildings remaining of that period. The Chapel was at the old core of North Clarendon Village where one would have found a Tavern, a Tea House and Inn.

3. Significant Characteristics

Exterior

- **Steeple**

The open shingled belfry has a polygonal spire and its original bell.

- **Roof**

Purple slate quarried in Vermont. It is a rare stone used for interior and exterior applications. It has superior properties and performance. It is uncommon and Its unique plum color and rich texture makes it very desirable.

- **Windows**

On the south, a 6/6 wood double-hung window, and 9/11 Queen Anne wood double-hung windows with colored glass. On the east, 9/11 Queen Anne wood double-hung windows with colored glass. On the north, 9/11 Queen Anne wood double-hung windows with colored glass.

Interior

- **Tin Ceiling Design**

A classic tin ceiling design was primarily comprised of various pieces: Tin ceiling tiles, moldings, fillers and cornices. The tin ceilings were installed in a variety of intricate patterns which made each ceiling unique, as the possible combinations and finishes when painted were literally endless. Some applications varied from minimal installations, which served as decorative focal points and were installed as small accent pieces in the room, while others would be much more elaborate, with the incorporation of a variety of tin ceiling designs, with multiple transitions that would cover the full room, and would continue from the ceiling down the wall to the floor.

- **Ceiling**

Tin ceilings were manufactured in tin plate, and other metal sheets such as copper, steel, aluminum or stainless-steel panels. The metal was then stamped with complex and sophisticated patterns, copied and developed from which originally, could easily be shipped across North America the finest carved and molded plasterwork.

Assessment by Architect Tom Keefe

Assessment by Architect Tom Keefe

This is a preliminary diagnostic report on conditions available to visual inspection at the time of our site visit; it is not a specification, and should not be used as a basis for contractor bids. Bid Documents contain substantially more information on quantities, standards, schedules, details and conditions of the work, which guide and protect both the Owner and the Contractor.

This assessment was partially funded by a grant from the Preservation Trust of Vermont and by the author.

October 19, 2017

As requested we visited North Clarendon Chapel on Oct.5, 2017 to examine and document existing conditions of the building, and to prepare this diagnostic report. Our findings are summarized below; conditions reported are those available to visual inspection at the time of our visit. Please note that while this report contains recommendations for repairs, it is not a specification for bidding; specifications contain substantially more information on quantity, quality and materials that both assist and protect you and potential bidders in carrying out repairs to your historic building.

The Chapel was listed on the State Register of Historic Places in 1980, and according to the SR Nomination was built in 1871. It is reported to have property boundaries at the line of the exterior walls, and therefore relations with neighbors will be a critically-important piece of ongoing planning. Neighbors on both sides were helpful to me on the day of the assessment.

Exterior

- **Steeple**

A small 5' square wood-framed steeple rests on the peak of the roof at the east end, and has a rusty galvanized metal roof and ball finial; the metal appears sound but weathered, and has a ragged drip edge especially on the north side. The metal needs painting, and may have pin-hole deterioration that is characteristic of weathered galvanized roofing. This roof is a prime candidate for application of a liquid membrane consolidation such as Acrylabs (www.acrylabs.com Mitchell Weinberger Technical Representative Acrylic Roof Systems 37 County Road Lincoln, VT 05443 802-453-4648 phone 800-881-6195 phone 802-453-6438 fax); this product is designed to consolidate historic roofs, and will last longer and more effectively than just painting the rusty metal, which is the other option.

Below the metal roof a bracketed wood cornice encircles the eaves above round arched openings on all 4 sides; a low balustrade protects each opening, and the flared exterior of the steeple base is covered in painted wood shingles that are substantially deteriorated. Most of the base flashing is concealed but where visible it appears rusty and should be replaced with a nonferrous flashing. We could not observe the deck inside the railings, where a bell is apparently located; this is likely to be either flat seam soldered metal, or some form of membrane, and needs to be checked – with access via a lift or long ladder on the exterior as there is no connection from the attic – to determine any repairs needed.

- **Roof**

The main roof is covered in purple slate nailed to the horizontal board roof deck, with a galvanized metal ridge cap; the small section of ridge cap east of the steeple is missing. A number of slates are hung on repair hooks. Approximately 12 slates on the south and six on the north are damaged, slipped or missing and need replacement; this is a yearly maintenance issue for slate roofs of this age. This roof appears to have been well-maintained, with relatively little current repair needed.

The shed roof on the west addition is covered with asphaltic roll roofing lapped up onto

the west gable of the original building; this material has failed and is leaking, and needs to be stabilized (blue tarp) immediately, and re-roofed as soon as possible. Framing has been affected and will need reinforcing or partial replacement, and should be treated with a fungicide preservative; it is exposed on the interior, where white dry-rot fungus is visible. New roofing should be properly flashed to the vertical west gable wall of the original building.

Access to work on any exterior items above the eaves of the main roof will be a significant part of the cost, and such work should be grouped where possible to take advantage of the expensive access (lift truck; staging; etc.). Use of the highest quality materials with the lowest maintenance requirements is an economical plan for these locations.

- **Chimney**

A 14 x 20 brick chimney centered on the ridge near the west end has a mortar wash and concealed base flashing; it is somewhat rough looking but appears sound. It should be checked to confirm the presence of a clay flue liner before use, and the base flashing should also be inspected up close to determine if any additional work is needed. A rain cap is always a good idea, to exclude rain and snow from the interior of the chimney.

- **Woodwork**

The Chapel has a very plain crown cornice and pitched board soffit, with a flat frieze, a simple peaked door head casing, and back-banding at the arches on the main windows. The Chapel has 5” flat corner boards, 4” window casings, 2” windowsills and clapboard siding spaced at 3” to the weather, all painted.

We noted probable water damage to the steeple railings, to the shingle siding on the lower part of the steeple, at the center of the south cornice (may be paint only?), to the siding and trim in a number of locations, and at the bottom 4 courses of siding on the north. There may be some framing deterioration behind this lower north wall; a PVC water table here might reduce deterioration and consequent maintenance. Rusty fasteners are showing through the paint in many locations at trim and siding. Some repairs will be suitable for epoxy (West System or Abatron are both good-quality options) and some may involve selective replacement in kind with new wood. There are likely to be additional discovered repairs not cited here.

- **Doors and Windows**

On the south, a 6/6 wood double-hung window with no storm needs sash conservation; (3) 9/11 Queen Anne wood double-hung windows with colored glass have no storms and need sash conservation.

On the east, (2) 9/11 Queen Anne wood double-hung windows with colored glass have no storms and need sash conservation. A 4-panel wood door needs maintenance repairs.

On the north, (3) 9/11 Queen Anne wood double-hung windows with colored glass have no storms and need sash conservation. A 6/6 wood double-hung window with no storm needs major sash conservation, and a plank wood door needs maintenance repairs.

There are no windows or doors on the west.

Sash conservation typically consists of removal of sash to a shop for complete disassembly and repair/re-glazing/re-painting, and prep/re-painting of the sill, jambs and casings before the sash is re-installed. It also includes provision of a secure security panel in the opening while the window is being repaired. Maintenance repairs can typically be done in place and involve lessextensive repairs to glazing, woodwork and finishes.

- **Paint**

All exterior wooden surfaces are painted white; the paint is very thin, suggesting infrequent repainting, and has worn off broad areas of siding on the south and east. Paint is alligatoring and flaking in many places, particularly around window and door trim and on siding on the north and west. The building needs a major (once-every-fifty-years) prep to remove old paint and thorough re-caulking, priming and painting. This is skilled work, not something that is apt to be well done by volunteers. In the event that full re-painting must be deferred pending planning/fund-raising, a paint stabilization phase should be considered; this would consist of a small amount of prep (basic wire-brushing to remove loose paint) and application of a latex primer on all bare wood, to hold it for a year or two until full painting can be done.

Paint maintenance, often deferred on historic buildings, is an important first line of defense against incessant weather and climate-related deterioration; staying ahead of

paint repairs not only protects the historic fabric of the building, but is almost always less expensive than waiting until deterioration to the painted substrates requires more invasive repair work.

Getting painters who are capable of the kind of careful and thorough preparation necessary to ensure good paint performance is difficult; *Preservation Brief #10: Exterior Paint Problems on Historic Woodwork* should be used as a guideline, and painters pre-qualified by their familiarity with these guidelines and a willingness to follow them.

Paint failure, especially with newer paints lacking the VOCs that older paints had, is a common problem, underscoring the need for careful preparation and use of the best possible materials, including caulks, primers and finish coats. The stages, causes and responses to paint failure are well-described in *Preservation Brief #10: Exterior Paint Problems on Historic Woodwork*, which should be used as a guideline in addressing paint repairs.

Prep work is 90% of the success of a paint job, and is skilled work that should not be left to amateurs. Although good-quality paint may appear expensive, most of the cost of painting is in labor, so that extending the cycle quickly becomes a substantial net gain. New lead-paint regulations will need to be followed; they should not increase the cost significantly.

- **Foundation**

The building sits on a concrete foundation consisting of (4) pyramidal piers spaced evenly along each side of the original building, with three additional piers along the back (west) wall of the shed addition. Concrete in-fill between piers occurs on the south but not the north side of the original building; wood infill is used on the south side of the addition. While somewhat rough, the foundation appears sound and not frost-heaved, suggesting that the piers extend below the frost line. Some form of enclosure should be considered to keep critters out from under the building, and also to improve comfort and energy performance if the building is heated.

- **Site**

Other than the 24' x 24' flat lawn between the building and the Town highway on the east,

the building is reported by the Owners to sit right on its property lines, with no land on either side or behind; to the south the neighbor's landscaping comes right to the building, and on the north and west the neighbor's lawn runs up to the building. The north neighbor, James Theodore (802/775-7368) introduced himself during my assessment visit, and explained that he has a sewer line from the adjacent building that angles SW from the corner of his building across the lawn behind the Chapel. He expressed concern that cars or any heavy equipment not operate on top of this sensitive infrastructure, but also expressed willingness to work with the Chapel owners to allow them needed space to place ladders or otherwise maintain their building. He reported that his previous overtures to the Chapel owners had been rebuffed. Cooperation with neighbors is critical to the survival of this building, and it is highly recommended that this channel of communication be re-opened and nurtured.

The stacked marble front step needs to be re-pitched away from the building. Planting crowding the building at the SE and SW corners needs cutting back or re-locating to allow ~ 3' of clear space. With no basement, drainage is less critical; the lands slopes very slightly to the west. A pitched crushed-stone 'splash' centered under all eaves drip lines would help control erosion and splash damage; a *de facto* scour line has been created on the south as water falling from the roof has washed away soil and fines. Work on either side will need to be carefully coordinated with the neighbors.

Interior

Interior repairs are generally of a lower priority than exterior ones, since they have less impact on the building's condition and are not as vulnerable to weather-related accelerated deterioration. We note conditions here for the record, and urge the owners to prepare a comprehensive preservation and maintenance plan that will address ongoing cyclical maintenance of all interior and exterior elements.

The small vestibule has worn carpet, and plaster on walls and ceiling needs repair. On the interior 4-panel wood doors are typical and need maintenance repairs.

The S. closet has fiberboard on the floor, much compromised by a burrowing animal

(woodchuck?), and plywood paneling on the walls and ceiling with plaster behind. All finishes are water-damaged, in rough condition and in need of extensive repairs. The N. closet has worn carpet on the floor, plywood paneling over damaged plaster on the walls, a 4-panel door, and acoustic tile on the ceiling.

The Sanctuary, with 10 ½' ceiling, has worn carpet on the floor, plaster walls with a deteriorated plywood wainscot, and a pressed-tin cove and ceiling that is extensively rusted but largely intact. This could likely be consolidated with a material like Acrylabs liquid membrane; if fiberglass insulation in the attic is replaced, it might be possible to paint the back side of the tin as well, which is where much of the rust is occurring.

The west shed addition comprises one large room with tongue & groove wood flooring, partial plaster that is in poor condition and no finish on about half the room. There is partial homasote sheathing on the ceiling that is water-damaged and in poor condition. Portions of the exposed ceiling framing (modified site-built trusses using small-size dimensional lumber) are wet and show white mold; reinforcement or even partial replacement will be necessary, as has already been started on the back wall. An old sheet-metal hot air furnace is located here, but does not appear inspected or operational.

A makeshift 2x4 vertical ladder in the S. closet leads up to the attic, which is unfinished, with no lighting. Rafters are 2x6 @ 16" o.c. with a 10 in 12 pitch, and opposing pairs are reinforced with collar ties; the gables are framed with 2x4 @ 16". The floor/Sanctuary ceiling is framed with 2x8 @ 16" spanning across the 24' wide building, and there is a 6" layer of fiberglass insulation. The span is too long for joists of this size, although we did not see signs of deflection, or note unusual 'bounce' when walking on the joists. Fiberglass insulation has proved to be far less effective than cellulose; if this insulation were removed, it may be possible to access the back side of the pressed tin ceiling below in order to apply some rust-inhibitive paint, before insulating with cellulose. An engineer should evaluate the potential additional load on the under-sized joists.

The extent and nature – and therefore cost – of interior renovations depends on planning that has not occurred yet, and therefore we will not attempt to guess what decisions will be made; for planning purposes we recommend you carry as a place-holder roughly $50-75/square foot to cover demolition, and very basic repairs, finishes, electric, heating, insulation and hardware.

Preservation strategies and costs

Repairs are ranked below in order of priority. It is also strongly recommended that you carry at least a 20% contingency for conditions that cannot be seen in a non-destructive investigation such as this one. Use of contractors skilled and experienced in preservation work will help to manage discovered conditions and insure that proper consideration is given to materials, practices and preservation concerns; this is usually the most cost-effective approach and protects the integrity of the building, including its eligibility for funding. Stabilization measures will likely be identified in the next phase of planning, to curtail on-going deterioration while fundraising and planning are carried out. Suggested phasing is discussed below, following the order-or-magnitude opinion of probable cost.

This opinion of probable cost addresses historic preservation issues; it is not based on full research, specifications or details, and should be considered advisory only. Our estimates are explicitly "Order of Magnitude" preliminary opinions of probable cost, exclusive of any Div.1 (General Conditions) costs, any specific costs associated with choice of materials and methods, any scale of work issues (small projects are more expensive per unit than larger ones), any project-specific conditions, any discovered conditions or additional information that a bidding contractor may well uncover, and that a specification can address but this brief report does not.

Costs are based on hired labor and new materials, both at market rates in a growing economy, taking into account special contractor expertise as required.

- **High Priority**

Repair framing/re-roof shed addition	Allow	$3,000.
Provide missing ridge flashing; repair slates (main roof)	"	1,300.
Repair siding/flashing @ bottom stage of steeple	"	1,500.
Sash conservation – (10) windows, (2) doors	"	15,000.
Subtotal:		20,800.

- **Medium Priority**

Woodworking repairs	Allow	2,000.
Full exterior prep/paint	"	14,000.
Subtotal:	"	16,000.

- **Low Priority**

Consolidate steeple metal roofing	Allow	2,000.
Re-set front steps with positive drainage	"	900.
Provide crushed stone 'splash' on N under eaves	"	800.
Subtotal:	"	3,700.
Total:		**$40,500.**

- **Phased Repairs**

Often a small non-profit will need to use a phased approach to repairs, to allow sufficient time for planning, fund-raising and oversight. In this event, an important first step is to halt the progress of deterioration, taking quick, inexpensive temporary measures that will not be part of the finished repair, but will stabilize the building in its present condition, reduce immediate hazards, and buy some time. Aesthetics are not a concern, nor is permanence beyond a limited period (typically 6 mo. – 2 years); keeping water and critters out of the building, and securing it against wind, weather and vandalism are the main goals of stabilization. Care should be exercised to avoid damaging historic material or creating conditions that allow condensation, mold growth or other unintended effects to occur.

For this building, stabilization will begin with stopping any roof leaks – particularly on the west shed addition. A tarp can be secured over this roof to provide temporary water-proofing; it needs to be secured tightly, and probably will need a little ballast (several 2x 8s for example) to discourage wind displacement. The main roof is generally sound, and does not need a tarp; some temporary flashing at visible holes around the steeple base (seen from the attic) might be advisable. Many windows are broken, allowing birds and

insects to enter; these should be secured with either inexpensive oriented strand board ("O.S.B.") or clear Plexiglas – the latter is preferable on at least some openings to allow natural light into the building so that electric light won't be required. Stabilization painting could also be done at this time, to protect any bare wood. These steps will address most if not all water infiltration issues without sealing up any potential moisture. Costs for stabilization should be modest, on the order of $1-2,000, and can employ volunteer efforts.

Concurrent with this, it is critical to reach out to the neighbors and to begin developing a strong working relationship with them; without this it will be exponentially harder and maybe impossible to save this building. Some research needs to be done to establish as far as possible the legal boundaries and deed description; these are useful facts to have going into any discussion with adjacent property owners, who will have standing at any permit hearings, and will be understandably curious about future plans for the building.

Assuming that the building is stabilized, good relationships are developed with neighbors, and that there is at least a core group committed to the preservation and re-use of the building, the next two important steps will involve planning (decisions on what the mission of the organization will be, what the building will be used for, how this will be administrated, and eventually plans and permitting for work needed) and fund-raising, including grants, direct appeals to stakeholders, benefits, etc. The Preservation Trust of VT will be an on-going valuable resource for all of these activities; they can link you with others who have successfully negotiated this process, and point you to countless sources of information, advice and funding. Raising ~$40,000 for the repairs indicated above is a reasonable scale of project for Vermont based on past experience; it is important to realize that additional funding will also be needed to maintain the building once it is repaired, and hopefully most of this can come from revenue generated by activities there. If the planned uses serve the community, and provide services and experiences valued by the stakeholders and the general public, the future of this historic resource will be much more secure. If the building and organization cannot fulfill such a need, it may not be possible to save it on this site, or possibly at all. Planning efforts need to include a long, hard look at this reality, and develop a credible strategy for implementing a self-sustaining process.

Conclusion

The immediate need is for stabilization, to halt on-going deterioration, and planning to establish the purpose and function of the building in the future. Repairs in the near future will return a number of deferred maintenance details to a condition requiring only routine maintenance; conversely, these problems will accelerate if not addressed. Employment of tradesmen with demonstrated expertise in historic building repairs - even though they appear more expensive than others - will avoid most maintenance problems created by unskilled repairs. Some repairs benefit greatly from using specifications for bidding (e.g. masonry; window restoration; painting) to guide the contractor and ensure that unqualified contractors are not selected based solely on a lower price; there is nothing more expensive than poorly-done work that has to be re-done.

A comprehensive plan for the use and periodic maintenance of the building should be developed to organize records, avoid costly repairs, anticipate cyclical replacement of materials, and utilize the best methods and materials from a growing body of research and experience with historic building maintenance, which often differs significantly from maintenance of newer buildings.

We are pleased to have had this opportunity to assist you in the on-going stewardship of this significant historic resource. Please don't hesitate to call if you have questions on any of the above, or need additional information or assistance in continuing restoration work on the building.

Sincerely,

Thomas F. Keefe, Architect
TFK/hos

Windows

- **Arched Stained Windows**

- **Overall Condition**

All of the windows noted above require significant restoration work. This will require labelling and carefully removing all sash to a workshop for bench repairs. Many panes of colored glass are either damaged or missing entirely.

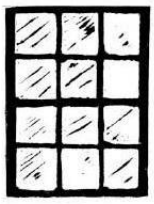
Window Condition Assessment made by Jackson Evans in June of 2019

- **General Description**

The sash windows in the main sanctuary at the North Clarendon Chapel are comprised of eight (8) arched top double hung sash wood frames in a Queen Anne style. The upper glazed arch on the top sash displays four glass panes of colored glass arranged in an array and supported visually by two stacked colored glass panes below surrounding a large central clear or frosted pane. The bottom sash displays 10 small colored panes surrounding a large central pane on the sides and bottom. The rear addition to the sanctuary contains two (2) six-over-six double hung wood sash windows with clear glass.

Tom Keefe, Architect

Assessment by Jackson



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July 22, 2019

North Clarendon Chapel

% Nicolette Asselin

PO Box 329

Clarendon, Vermont 05777

Dear Ms. Asselin,

It is my pleasure to present you and your board with the following report based on my visit with you and your assistant at the North Clarendon Chapel on May 31, 2019. This report is a summary of our conversation and the observations I made during my time on site as well as from notes made reviewing the assessment completed by Thomas Keefe in 2017.

If you have additional questions please feel free to ask. And please keep me informed as plans for the building's preservation move forward.

Sincerely,

Jackson Evans

Black Sash Restoration, LLC

Condition Assessment of Windows and Doors at

North Clarendon Chapel

General Description

The sash windows in the main sanctuary at the North Clarendon Chapel are comprised of eight (8) arched top double hung sash wood frames in a Queen Anne style. The upper glazed arch on the top sash displays four glass panes of colored glass arranged in an array and supported visually by two stacked colored glass panes below surrounding a large central clear or frosted pane. The bottom sash displays 10 small colored panes surrounding a large central pane on the sides and bottom. The rear addition to the sanctuary contains two (2) six-over-six double hung wood sash windows with clear glass.

Overall Condition

All of the windows noted above require significant restoration work. This will require labelling and carefully removing all sash to a workshop for bench repairs. Many panes of colored glass are either damaged or missing entirely.

Recommendations for Restoration

1. Top and bottom sash should be removed by a window restoration professional and labelled for reinstallation in their original openings. Sash should be taken to a workshop for bench repairs.

2. Interior sash stops (see "*Anatomy of a Double-Hung Window*" in the Appendix of this report for diagram of window parts) will be similarly labeled and removed for bench repairs.

3. Parting beads should be removed and salvaged if possible or replaced in-kind if not salvageable. These should be labeled as well for later re-installation.

4. Bench repairs will follow a similar pattern to that described below:

    a. All extant glass will labeled using Sharpie or grease pencil for re-installation in their original sash.

    b. Glazing putty will be removed using steam, chisel or putty knife, whichever

method is found to be the gentlest possible with great care taken not to damage any of the intact panes.

c. Glazing rabbets will be scraped of remaining putty or paint.

d. Interior and exterior paint will be removed using appropriate methods to a point of refusal.

e. Repairs to the sash frames will be made using Dutchmen patches of matching wood species or epoxy fillers.

f. Any repairs to the joints will not use screws, glue or other metal hardware.

g. All bare wood surfaces will be consolidated with a linseed oil mixture or similar.

h. Hardware will be cleaned and oiled in place.

i. Frames will be primed using an approved primer with care taken not to paint the glazing rabbets.

j. Glass will be reinstalled using linseed oil based glazing putty (Sarco Multiglaze or AllBack).

k. Bed glazing will be laid down first, followed by glass, careful bedded, glazing points installed, and top glazing putty after that.

l. Putty will be allowed to cure for the entire time recommended by the manufacturer.

m. Once cured, the interior and exterior of the sash will be painted with two coats of approved paint.

n. After the paint has been allowed to cure, the glass will be cleaned prior to transport back to the site for reinstallation.

o. Parting beads that were salvageable will be scraped to a point of refusal, primed and painted with two top coats.

p. Interior sash stops will be scraped to a point of refusal, primed and painted with two top coats.

5. Following bench repairs, the sash will be reinstalled in their original locations.

6. The sash stops will be installed and "tuned" to allow for easy operation of the sash.

While the sash are removed for bench repairs, work on the interior and exterior jambs, sills, casings can be carried out. That work should be carried out as follows:

1. Loose or failing paint should be hand scraped to a point of refusal on both the interior and exterior. **NOTE: given the age of the building, the likelihood of the presence of lead paint is high. All appropriate and statutorily prescribed lead safe work practices should be adhered to rigorously.**

2. The exterior sill, casings and jambs all show signs of significant weather checking as a result of loss of paint. These areas should be treated with a consolidating product (Abatron Liquid Wood is one example) in order to prepare the surface for epoxy repairs.

3. Once the treated wood surfaces have been allowed to dry, deep checking and cracks, especially along the window sill, should be filled with a specially formulated wood epoxy (Abatron WoodEpox is one example) following the manufacturer's recommendations for application and curing.

4. Any missing members should be replaced in-kind with new members milled to match from an appropriates D Select or better grade lumber.

5. Once replacement in-kind and epoxy repairs are completed, the surfaces should be primed with a high quality primer as specified by the project manager.

While the windows are out for restoration work, the openings should be secured with plywood. Another option would be to install new storm windows on the exterior to secure the openings left by the removed window.

Storm Window Recommendations

The addition of storm windows will provide a layer of protection for the historic wood windows as well as make the interior of the building more comfortable. Whether those storm window are applied to the interior or the exterior of the building is a decision the board must make. This decision can affect the aesthetics of the building overall as well as the level of protection provided to the historic wood windows.

Rough Cost Estimate for the Above Described Work

The following is a rough cost estimate for the completion of window and entry door restoration work. This estimate is intended for planning purposes only and may be used as a starting point for seeking grant funding or preparing to bid the project out.

Window Restoration	$1,200 - $1,500 per window opening for arch topped windows
	$600 - $800 per window opening for six-over-six windows
Subtotal Windows	$10,800 - $13,600
Storm Windows	$1,000 - $1,200 per window opening
Doorway Restoration	$1,000 - $1,200
Total	**$12,800 - $16,000**

Sample Window and Door Restoration RFP

The following is provided as a sample Request for Proposals (RFP) that could be used to solicit bids from qualified window restoration professionals in order to competitively bid the work for the windows at the North Clarendon Chapel. A list of qualified window restoration professionals is maintained by the Preservation Trust of Vermont at the following web address:

http://ptvermont.org/vermontrestorationdirectory/wpbdp_category/windows-doors-restoration-conservation/

Request for Proposals: North Clarendon Chapel Window and Door Restoration The North Clarendon Historical Society is seeking bids from qualified window restoration professionals and firms for the restoration of ten (10) historic wood sash windows and one (1) historic entry door at the North Clarendon Chapel. This project also includes the purchase and installation of storm windows.

A meeting *[this can be mandatory or voluntary and you can hold more than one if bidders can't make it]* of interested bidders will be held on _____(date)_____ at ___(time)_____ at the North Clarendon Chapel, 537 Old Route 7, North Clarendon, Vermont 05759

Work will be carried between _____(date) and _____(date)_____ with project completion no later than _____(date).

Sealed bids must be postmarked, hand delivered or emailed no later than _____(date TBD)_____ and will be opened and reviewed on _____(date TBD)_____ with all bidders notified of the outcome to follow.

Scope of Project:

-restoration of eight (8) roughly 34" wide by 82"tall arched top double hung wood sash windows in the Queen Anne style with colored glass borders

-restoration of two (2) roughly 34" wide by 68" tall double hung wood sash windows

-restoration of one (1) wood entry door and surround

-purchase and installation of high quality storm windows for all windows noted above

For questions or additional information please contact: (name, email and phone)

(END of RFP)

Conclusion

The historic windows at the North Clarendon Chapel are one of the few areas of embellishment on an otherwise unadorned country church. For this reason they carry a great deal of historic and aesthetic significance and warrant carefully restoration. Once restored the windows will provide an outward and very visible representation of the progress being made on the overall restoration of this wonderful community asset.

Paint Preservation Brief

10 PRESERVATION BRIEFS

Exterior Paint Problems on Historic Woodwork

Kay D. Weeks and David W. Look, AIA

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

A cautionary approach to paint removal is included in the guidelines to "The Secretary of the Interior Standards for Historic Preservation Projects." Removing paints down to bare wood surfaces using harsh methods can permanently damage those surfaces; therefore such methods are not recommended. Also, total removal obliterates evidence of the historical paints and their sequence and architectural context.

This Brief expands on that advice for the architect, building manager, contractor, or homeowner by identifying and describing common types of paint surface conditions and failures, then recommending appropriate treatments for preparing exterior wood surfaces for repainting[1] to assure the best adhesion and greatest durability of the new paint. Although the Brief focuses on responsible methods of "paint removal," several paint surface conditions will be described which do not require any paint removal, and still others which can be successfully handled by limited paint removal. In all cases, the information is intended to address the concerns related to exterior wood. It will also be generally assumed that, because houses built before 1950 involve one or more layers of lead-base paint, [2] the majority of conditions warranting paint removal will mean dealing with this toxic substance along with the dangers of the paint removal tools and chemical strippers themselves.

Purposes of Exterior Paint

Paint applied to exterior wood must withstand yearly extremes of both temperature and humidity. While never expected to be more than a temporary physical shield— requiring re-application every 5-8 years—its importance should not be minimized. Because one of the main causes of wood deterioration is moisture penetration, a primary purpose for painting wood is to exclude such moisture, thereby slowing deterioration not only of a building's exterior siding and decorative features but, ultimately, its underlying structural members. Another important purpose for painting wood is, of course, to define and accent architectural features and to improve appearance.

Treating Paint Problems in Historic Buildings

Exterior paint is constantly deteriorating through the processes of weathering, but in a program of regular maintenance—assuming all other building systems are functioning properly—surfaces can be cleaned, lightly scraped, and hand sanded in preparation for a new finish coat. Unfortunately, these are ideal conditions. More often, complex maintenance problems are inherited by owners of historic buildings, including areas of paint that have failed[4] beyond the point of mere cleaning, scraping, and hand sanding (although much so-called "paint failure" is attributable to interior

or exterior moisture problems or surface preparation and application mistakes with previous coats).

Although paint problems are by no means unique to historic buildings, treating multiple layers of hardened, brittle paint on complex, ornamental—and possibly fragile—exterior wood surfaces necessarily requires an extremely cautious approach (see figure 1). In the case of recent construction, this level of concern is not needed because the wood is generally less detailed and, in addition, retention of the sequence of paint layers as a partial record of the building's history is not an issue.

When historic buildings are involved, however, a special set of problems arises—varying in complexity depending upon their age, architectural style, historical importance, and physical soundness of the wood—which must be carefully evaluated so that decisions can be made that are sensitive to the longevity of the resource.

Justification for Paint Removal

At the outset of this Brief, it must be emphasized that removing paint from historic buildings—with the exception of cleaning, light scraping, and hand sanding as part of routine maintenance—should be avoided unless absolutely essential. Once conditions warranting removal have been identified, the general approach should be to remove paint to the next sound layer using the gentlest means possible, then to repaint (see figure 2). Practically speaking as well, paint can adhere just as effectively to existing paint as to bare wood, providing the previous coats of paint are also adhering uniformly and tightly to the wood and the surface is properly prepared for repainting— cleaned of dirt and chalk and dulled by sanding. But, if painted exterior wood surfaces display continuous patterns of deep cracks or if they are extensively blistering and peeling so that bare wood is visible, then the old paint should be completely removed before repainting. The only other justification for removing all previous layers of paint is if doors, shutters, or windows have literally been painted shut," or if new wood is being pieced-in adjacent to old painted wood and a smooth transition is desired (see figure 3).

Fig. 1 Excessive paint build-up on architectural details such as this ornamental bracket does not in itself justify total paint removal. If paint is cracked and peeling down to bare wood, however, it should be removed using the gentlest means possible. Photo: David W. Look, AIA.

Paint Removal Precautions

1 General paint type recommendations will be made, but paint color recommendations are beyond the scope of this Brief.

2 Douglas R. Shier and William Hall, Analysis of Housing Data Collected in a LeadBased Paint Survey in Pittsburgh, Pennsylvania, Part 1, National Bureau of Standards, Inter-Report 77-1250, May 1977.

3 Any pigmented liquid, liquefiable, or mastic composition designed for application to a substrate in a thin layer which is converted to an opaque solid film after application. Paint and Coatings Dictionary, 1978. Federation of Societies for Coatings and Technology.

4 For purposes of the Brief, this includes any area of painted exterior woodwork displaying signs of peeling, cracking, or alligatoring to bare wood. See descriptions of these and other paint surface conditions as well as recommended treatments on pp. 5-10.

Because paint removal is a difficult and painstaking process, a number of costly, regrettable experiences have occurred—and continue to occur—for both the historic building and the building owner. Historic buildings have been set on fire with blow torches; wood irreversibly scarred by sandblasting or by harsh mechanical devices such as rotary sanders and rotary wire strippers; and layers of historic paint inadvertently and unnecessarily removed. In addition, property owners, using techniques that substitute speed for safety, have been injured by toxic lead vapors or dust from the paint they were trying to remove or by misuse of the paint removers themselves.

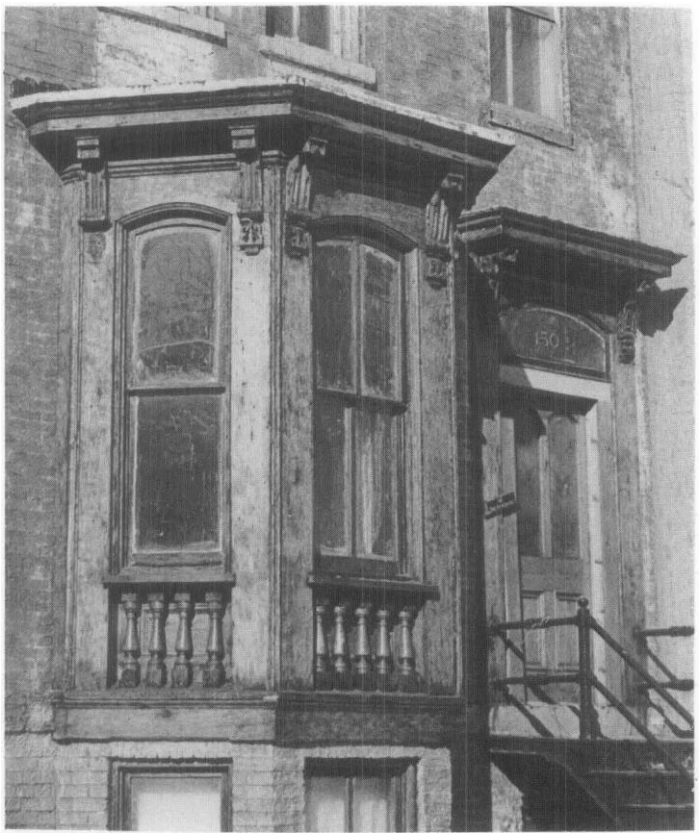

Fig. 2 A traditionally painted bay window has been stripped to bare wood, then varnished. In addition to being historically inaccurate, the varnish will break down faster as a result of the sun's ultraviolet rays than would primer and finish coats of paint. Photo: David W. Look, AIA.

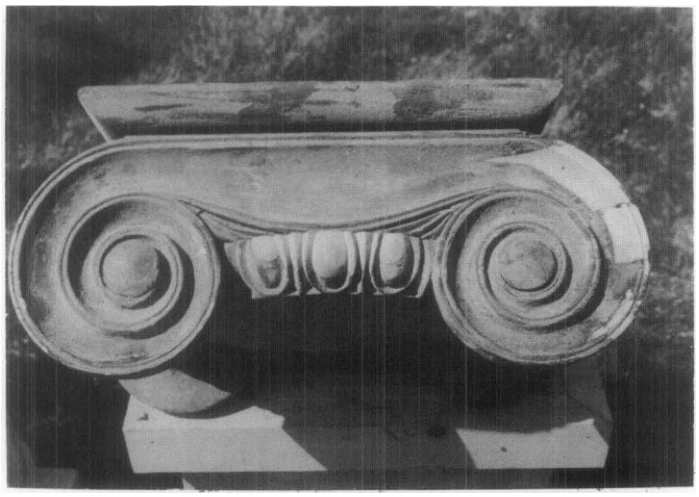

Fig. 3 If damage to parts of a wooden element is severe, new sections of wood will need to be pieced-in. When such piecing is required, paint on the adjacent woodwork should be removed so that the old and new woods will make a smooth profile when joined. After repainting, the repair should be virtually impossible to detect. Photo: Morgan W. Phillips.

Owners of historic properties considering paint removal should also be aware of the amount of time and labor involved. While removing damaged layers of paint from a door or porch railing might be readily accomplished within a reasonable period of time by one or two people, removing paint from larger areas of a building can, without professional assistance, easily become unmanageable and produce less than satisfactory results. The amount of work involved in any paint removal project must therefore be analyzed on a case-by-case basis. Hiring qualified professionals will often be a cost-effective decision due to the expense of materials, the special equipment required, and the amount of time involved. Further, paint removal companies experienced in dealing with the inherent health and safety dangers of paint removal should have purchased such protective devices as are needed to mitigate any dangers and should also be aware of State or local environmental and/or health regulations for hazardous waste disposal.

All in all, paint removal is a messy, expensive, and potentially dangerous aspect of rehabilitating or restoring historic buildings and should not be undertaken without careful thought concerning first, its necessity, and second, which of the available recommended methods is the safest and most appropriate for the job at hand.

Repainting Historic Buildings for Cosmetic Reasons

If existing exterior paint on wood siding, eaves, window sills, sash, and shutters, doors, and decorative features shows no evidence of paint deterioration such as chalking, blistering, peeling, or cracking, then there is no physical reason to repaint, much less remove paint! Nor is color fading, of itself, sufficient justification to repaint a historic building.

The decision to repaint may not be based altogether on paint failure. Where there is a new owner, or even where ownership has remained constant through the years, taste in colors often changes. Therefore, if repainting is primarily to alter a building's primary and accent colors, a technical factor of paint accumulation should be taken into consideration. When paint builds up to a thickness of approximately 1/16" (approximately 16-30 layers), one or more extra coats of paint may be enough to trigger cracking and peeling in limited or even widespread areas of the building's surface. This results because excessively thick paint is less able to withstand the shrinkage or pull of an additional coat as it dries and is also less able to tolerate thermal stresses. Thick paint invariably fails at the weakest point of adhesion—the oldest layers next to the wood. Cracking and peeling follow. Therefore, if there are no signs of paint failure, it may be somewhat risky to add still another layer of unneeded paint simply for color's sake (extreme changes in color may also require more than one coat to provide proper hiding power and full color). When paint appears to be nearing the critical thickness, a change of accent colors (that is, just to limited portions of the trim) might be an acceptable compromise without chancing cracking and peeling of paint on wooden siding.

If the decision to repaint is nonetheless made, the "new' color or colors should, at a minimum, be appropriate to the style and setting of the building. On the other hand, where the intent is to restore or accurately reproduce the colors originally used or those from a significant period in the building's evolution, they should be based on the results of a paint analysis.

Identification of Exterior Paint Surface Conditions/ Recommended Treatments

It is assumed that a preliminary check will already have been made to determine, first, that the painted exterior surfaces are indeed wood—and not stucco, metal, or other wood substitutes—and second, that the wood has not decayed so that repainting would be superfluous. For example, if any area of bare wood such as window sills has been exposed for a long period of time to standing water, wood rot is a strong possibility (see figure 4). Repair or replacement of deteriorated wood should take place before repainting. After these two basic issues have been resolved, the surface condition identification process may commence.

The historic building will undoubtedly exhibit a variety of exterior paint surface conditions. For example, paint on the wooden siding and doors may be adhering firmly; paint on the eaves peeling; and paint on the porch balusters and window sills cracking and alligatoring. The accurate identification of each paint problem is therefore the first step in planning an appropriate overall solution.

Paint surface conditions can be grouped according to their relative severity: CLASS I conditions include minor blemishes or dirt collection and generally require no paint removal; CLASS Il conditions include failure of the top layer or layers of paint and generally require limited paint removal; and CLASS Ill conditions include substantial or multiple-layer failure and generally require total paint removal. It is precisely because conditions will vary at different points on the building that a careful inspection is critical. Each item of painted exterior woodwork (i.e., siding, doors, windows, eaves, shutters, and decorative elements) should be examined early in the planning phase and surface conditions noted.

CLASS I Exterior Surface Conditions Generally Requiring No Paint Removal

• Dirt, Soot, Pollution, Cobwebs, Insect Cocoons, etc.

Cause of Condition

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

Recommended Treatment

Most surface matter can be loosened by a strong, direct stream of water from the nozzle of a garden

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

See the Reading List for paint research and documentation information. See also *The Secretary of the Interior •s Standards for Historic Preservation Projects with Guidelines for Applying the Standards for recommended approaches on paints and finishes within various types of project work treatments.*

• Mildew

Cause of Condition

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

Recommended Treatment

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

• Excessive Chalking

Cause of Condition

Chalking—or powdering of the paint surface—is caused by the gradual disintegration of the resin in the paint film. (The amount of chalking is determined both by the formulation of the paint and the amount of ultraviolet light to which the paint is exposed.) In moderation, chalking is the ideal way for a paint to "age," because the chalk, when rinsed by rainwater, carries discoloration and dirt away with it and thus provides an ideal surface for repainting. In excess, however, it is not desirable because the chalk can wash down onto a surface of a different color beneath the painted area and cause streaking as well as rapid disintegration of the paint film itself. Also, if a (as the old white lead carbonate/oil paints often did), excessive chalking can result.

Recommended Treatment

The chalk should be cleaned off with a solution of 1/2 cup household detergent to one gallon water, using a medium soft bristle brush. After scrubbing to remove the chalk, the surface should be rinsed with a direct stream of water from the nozzle of a garden hose, allowed to dry thoroughly, (but not long enough for the chalking process to recur) and repainted, using a non-chalking paint.

• Staining

Cause of Condition

Staining of paint coatings usually results from excess moisture reacting with materials within the wood substrate. There are two common types of staining, neither of which requires paint removal. The most prevalent type of stain is due to the oxidation or rusting of iron nails or metal (iron, steel, or copper) anchorage devices. A second type of stain is caused by a chemical reaction between moisture and natural extractives in certain woods (red cedar or redwood) which results in a surface deposit of colored matter. This is most apt to occur in new replacement wood within the first 10-15 years.

Recommended Treatment

In both cases, the source of the stain should first be located and the moisture problem corrected.
When stains are caused by rusting of the heads of nails used to attach shingles or siding to an exterior wall or by rusting or oxidizing iron, steel, or copper anchorage

devices adjacent to a painted surface, the metal objects themselves should be hand sanded and coated with a rust inhibitive primer followed by two finish coats. (Exposed nail heads should ideally be countersunk, spot primed, and the holes filled with a high-quality wood filler except where exposure of the nail head was part of the original construction system or the wood is too fragile to withstand the countersinking procedure.) Discoloration due to color extractives in replacement wood can usually be cleaned with a solution of equal parts denatured alcohol and water.

After the affected area has been rinsed and permitted to dry, a "stain-blocking primer" especially developed for preventing this type of stain should be applied (two primer coats are recommended for severe cases of bleeding prior to the finish coat). Each primer coat should be allowed to dry at least 48 hours.

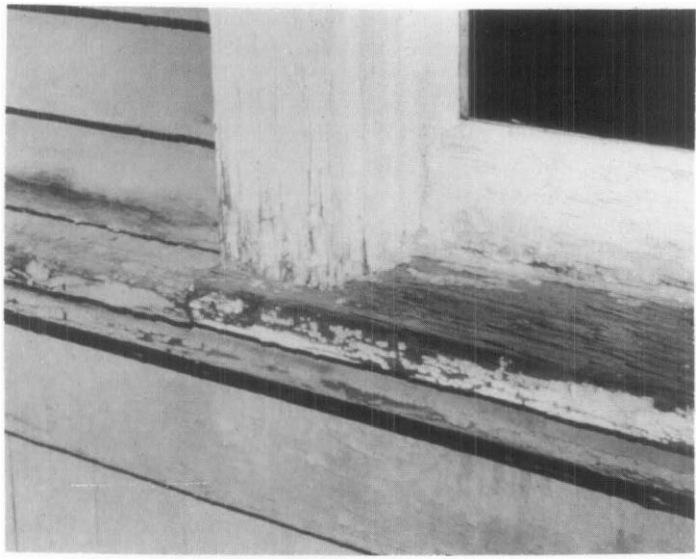

Fig. 4 Paint films wear unevenly depending on exposure and location. Exterior locations which are susceptible to accelerated deterioration are horizontal surfaces such as windowsills.

These and similar areas will require repainting more often than less vulnerable surfaces. In the case of this window sill where paint has peeled off and adjacent areas have cracked and alligatored, the paint should be totally removed. Prior to repainting, any weathered wood should be rejuvenated using a solution of 3 cups exterior varnish, 1 oz. paraffin wax, and mineral spirits/ paint thinner/or turpentine to make 1 gallon. Liberal brush application should be made.

This formula was tested over a 20-year period by the U.S. Department of Agriculture's Forest Products Laboratory and proved to be just as effective as water repellent preservatives containing pentachlorophenol. After the surface has thoroughly dried (2-3 days of warm weather), the treated surface can be painted. A high quality oil-base primer followed by two top coats of a semi-gloss oil-enamel or latexenamel paint is recommended. Photo: Baird M. Smith, AIA.

CLASS II Exterior Surface Conditions Generally Requiring Limited Paint Removal

• Crazing

Cause of Condition

Crazing—fine, jagged interconnected breaks in the top layer of paint—results when paint that is several layers thick becomes excessively hard and brittle with age and is consequently no longer able to expand and contract with the wood in response to changes in temperature and humidity (see figure 5). As the wood swells, the bond between paint layers is broken and hairline cracks appear. Although somewhat more difficult to detect as opposed to other more obvious paint problems, it is well worth the time to scrutinize all surfaces for crazing. If not corrected, exterior moisture will enter the crazed surface, resulting in further swelling of the wood and, eventually, deep cracking and alligatoring, a Class Ill condition which requires total paint removal.

Recommended Treatment

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

Fig. 5 Crazing—or surface cracking—is an exterior surface condition which can be successfully treated by sanding and painting. Photo: Courtesy, National Decorating Products Association.

• Intercoat Peeling

Cause of Condition

Intercoat peeling can be the result of improper surface preparation prior to the last repainting. This most often occurs in protected areas such as eaves and covered porches because these surfaces do not receive a regular rinsing from rainfall, and salts from air-borne pollutants thus accumulate on the surface. If not cleaned off, the new paint coat will not adhere properly and that layer will peel.

Another common cause of intercoat peeling is incompatibility between paint types (see figure 6). For example, if oil paint is applied over latex paint, peeling of the top coat can sometimes result since, upon aging, the oil paint becomes harder and less elastic than the latex paint. If latex paint is applied over old, chalking oil paint, peeling can also occur because the latex paint is unable to penetrate the chalky surface and adhere.

Recommended Treatment

First, where salts or impurities have caused the peeling, the affected area should be washed down thoroughly after scraping, then wiped dry. Finally, the surface should be hand or mechanically sanded, then repainted.

Where peeling was the result of using incompatible paints, the peeling top coat should be scraped and hand or mechanically sanded. Application of a high quality oil type exterior primer will provide a surface over which either an oil or a latex topcoat can be successfully used.

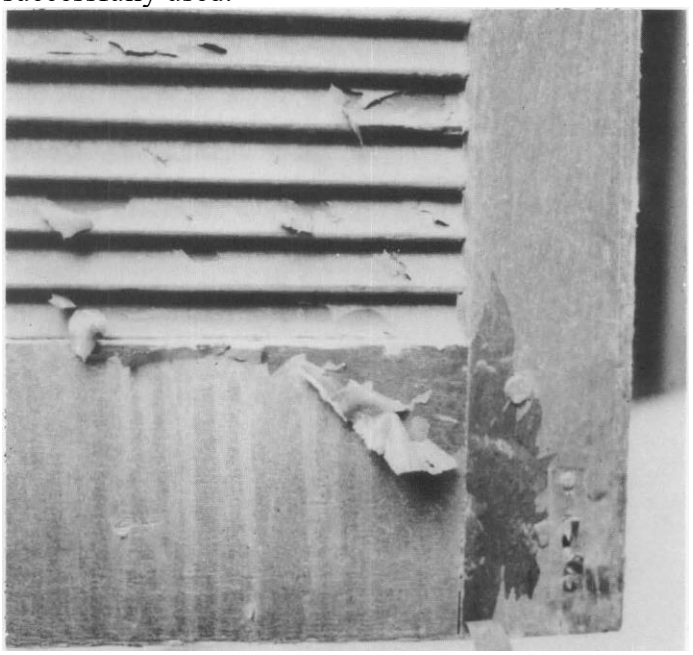

Fig. 6 This is an example of intercoat peeling. A latex top coat was applied directly over old oil paint and, as a result, the latex paint was unable to adhere. If latex is being used over oil, an oilbase primer should be applied first. Although much of the peeling latex paint can be scraped off, in this case, the best solution may be to chemically dip strip the entire shutter to remove all of the paint down to bare wood, rinse thoroughly, then repaint. Photo: Mary L. Oehrlein, AIA.

• Solvent Blistering

Cause of Condition

Solvent blistering, the result of a less common application error, is not caused by moisture, but by the action of ambient heat on paint solvent or thinners in the paint film. If solvent-rich paint is applied in direct sunlight, the top surface can dry too quickly and, as a result, solvents become trapped beneath the dried paint film. When the solvent vaporizes, it forces its way through the paint film, resulting in surface blisters. This problem occurs more often with dark colored paints because darker colors absorb more heat than lighter ones. To distinguish between solvent blistering and blistering caused by moisture, a blister should be cut open. If another layer of paint is visible, then solvent blistering is likely the problem whereas if bare wood is revealed, moisture is probably to blame. Solvent blisters are generally small.

Recommended Treatment

Solvent-blistered areas can be scraped, hand or mechanically sanded to the next sound layer, then repainted. In order to prevent blistering of painted surfaces, paint should not be applied in direct sunlight.

• Wrinkling

Cause of Condition

Another error in application that can easily be avoided is wrinkling (see figure 7). This occurs when the top layer of paint dries before the layer underneath. The top layer of paint actually moves as the paint underneath (a primer, for example) is drying. Specific causes of wrinkling include: (1) applying paint too thick; (2) applying a second coat before the first one dries; (3) inadequate brushing out; and (4) painting in temperatures higher than recommended by the manufacturer.

Recommended Treatment

The wrinkled layer can be removed by scraping followed by hand or mechanical sanding to provide as even a surface as possible, then repainted following manufacturer's application instructions.

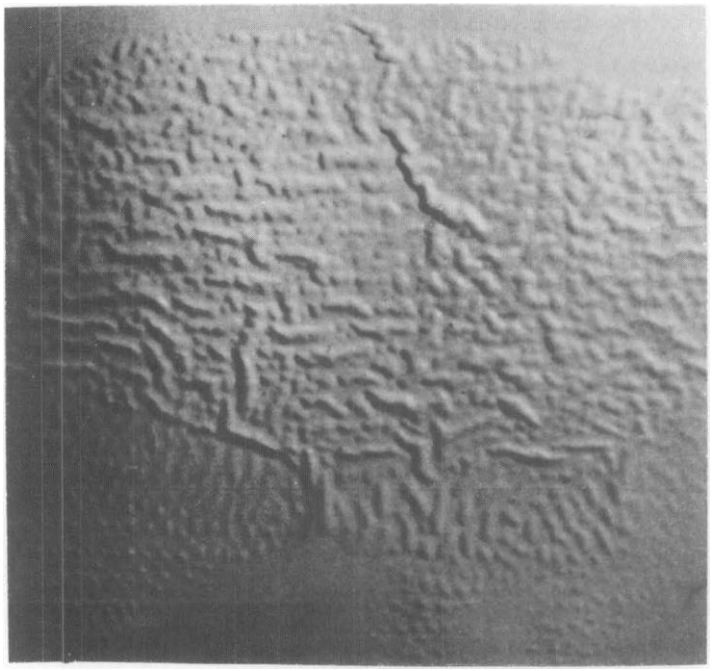

Fig. 7 Wrinkled layers can generally be removed by scraping anc sanding as opposed to total paint removal. Following manufacturers' application instructions is the best way to avoid this surface condition. Photo: Courtesy, National Decorating Products Association.

CLASS III Exterior Surface Conditions Generally Requiring Total Paint Removal

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

• Peeling

Cause of Condition

Peeling to bare wood is most often caused by excess interior or exterior moisture that collects behind the paint film, thus impairing adhesion (see figure 8). Generally beginning as blisters, cracking and peeling occur as moisture causes the wood to swell, breaking the adhesion of the bottom layer.

Recommended Treatment

There is no sense in repainting before dealing with the moisture problems because new paint will simply fail. Therefore, the first step in treating peeling is to locate and remove the source or sources of the

moisture, not only because moisture will jeopardize the protective coating of paint but because, if left unattended, it can ultimately cause permanent damage to the wood. Excess interior moisture should be removed from the building through installation of exhaust fans and vents. Exterior moisture should be eliminated by correcting the following conditions prior to repainting: faulty flashing; leaking gutters; defective roof shingles; cracks and holes in siding and trim; deteriorated caulking in joints and seams; and shrubbery growing too close to painted wood. After the moisture problems have been solved, the wood must be permitted to dry out thoroughly. The damaged paint can then be scraped off with a putty knife, hand or mechanically sanded, primed, and repainted.

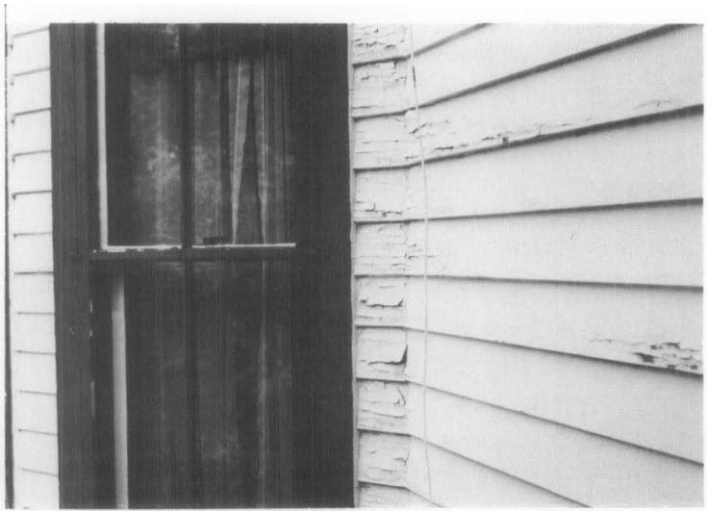

Fig. 8 Peeling to bare wood—one of the most common types of paint failure—is usually caused by an interior or exterior moisture problem. Photo: Anne E. Grimmer.

• Cracking/ Alligatoring

Cause of Condition

Cracking and alligatoring are advanced stages of crazing (see figure 9). Once the bond between layers has been broken due to intercoat paint failure, exterior moisture is able to penetrate the surface cracks, causing the wood to swell and deeper cracking to take place. This process continues until cracking, which forms parallel to grain, extends to bare wood. Ultimately, the cracking becomes an overall pattern of horizontal and vertical breaks in the paint layers that looks like reptile skin; hence, "alligatoring." In advanced stages of cracking and alligatoring, the surfaces will also flake badly.

Recommended Treatment

If cracking and alligatoring are present only in the top layers they can probably be scraped, hand or mechanically sanded to the next sound layer, then repainted. However, if cracking and/or alligatoring have progressed to bare wood and the paint has begun to flake, it will need to be totally removed. Methods include scraping or paint removal with the electric heat plate, electric heat gun, or chemical strippers, depending on the particular area involved. Bare wood should be primed within 48 hours, then repainted.

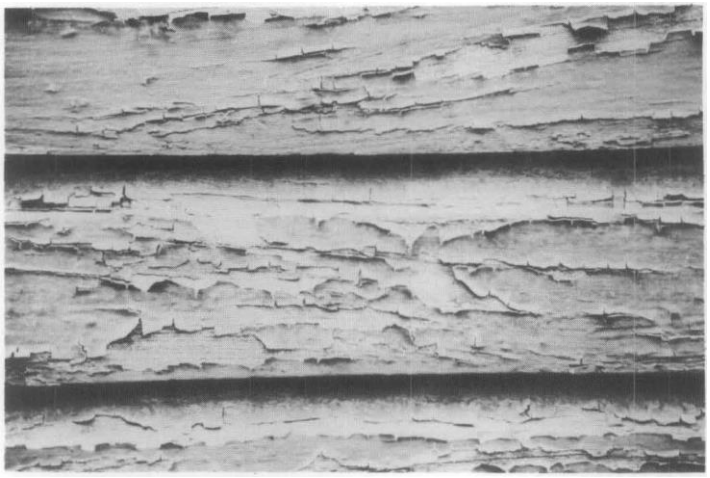

Fig. 9 Cracking, alligatoring, and flaking are evidence of longterm neglect of painted surfaces. The remaining paint on the clapboard shown here can be removed with an electric heat plate and wide-bladed scraper. In addition, unsound wood should be replaced and moisture problems corrected before primer and top coats of paint are applied. Photo} David W. Look, AIA.

Selecting the Appropriate/ Safest Method to Remove Paint

After having presented the "hierarchy" of exterior paint surface conditions—from a mild condition such as mildewing which simply requires cleaning prior to repainting to serious conditions such as peeling and alligatoring which require total paint removal—one important thought bears repeating: if a paint problem has been identified that warrants either limited or total paint removal, the gentlest method possible for the particular wooden element of the historic building should be selected from the many available methods.

The treatments recommended—based upon field testing as well as onsite monitoring of Department of Interior grant-in-aid and certification of rehabilitation projects— are therefore those which take three over-riding issues into consideration (1) the continued protection and preservation of the historic exterior woodwork; (2) the retention of the sequence of historic paint layers; and (3) the health and safety of those individuals performing the paint removal. By applying these criteria, it will be seen that no paint removal method is without its drawbacks and all recommendations are qualified in varying degrees.

Methods for Removing Paint

After a particular exterior paint surface condition has been identified, the next step in planning for repainting—if paint removal is required—is selecting an appropriate method for such removal.

The method or methods selected should be suitable for the specific paint problem as well as the particular wooden element of the building. Methods for paint removal can be divided into three categories (frequently, however, a combination of the three methods is used).

Each method is defined below, then discussed further and specific recommendations made:

Abrasive—"Abrading" the painted surface by manual and/or mechanical means such as scraping and sanding. Generally used for surface preparation and limited paint removal.

Thermal—Softening and raising the paint layers by applying heat followed by scraping and sanding. Generally used for total paint removal.

Chemical—Softening of the paint layers with chemical strippers followed by scraping and sanding. Generally used for total paint removal.

• Abrasive Methods (Manual)

If conditions have been identified that require limited paint removal such as crazing, intercoat peeling, solvent blistering, and wrinkling, scraping and hand sanding should be the first methods employed before using mechanical means. Even in the case of more serious conditions such as peeling—where the damaged paint is weak and already sufficiently loosened from the wood surface— scraping and hand sanding may be all that is needed prior to repainting.

Recommended Abrasive Methods (Manual)

Putty Knife/Paint Scraper: Scraping is usually accomplished with either a putty knife or a paint scraper, or both. Putty knives range in width from one to six inches and have a beveled edge. A putty knife is used in a pushing motion going under the paint and working from an area of loose paint toward the edge where the paint is still firmly adhered and, in effect, "beveling" the remaining layers so that as smooth a transition as possible is made between damaged and undamaged areas (see figure 10).

Paint scrapers are commonly available in 1 5/16, 2 1/2, and 3 1/2 inch widths and have replaceable blades. In addition, profiled scrapers can be made specifically for use on moldings. As opposed to the putty knife, the paint scraper is used in a pulling motion and works by raking the damaged areas of paint away.

The obvious goal in using the putty knife or the paint scraper is to selectively remove the affected layer or layers of paint; however, both of these tools, particularly the paint scraper with its hooked edge, must be used with care to properly prepare the surface and to avoid gouging the wood.

Sandpaper/Sanding Block/Sanding sponge: After manually removing the damaged layer or layers by scraping, the uneven surface (due to the almost inevitable removal of varying numbers of paint layers in a given area) will need to be smoothed or "feathered out" prior to repainting. As stated before, hand sanding, as opposed to harsher mechanical sanding, is recommended if the area is relatively limited. A coarse grit, open-coat flint sandpaper—the least expensive kind—is useful for this purpose because, as the sandpaper clogs with paint it must be discarded and this process repeated until all layers adhere uniformly.

Blocks made of wood or hard rubber and covered with sandpaper are useful for handsanding flat surfaces. Sanding sponges—rectangular sponges with an abrasive aggregate on their surfaces—are also available for detail work that requires reaching into grooves because the sponge easily conforms to curves and irregular surfaces. All sanding should be done with the grain.

Summary of Abrasive Methods (Manual)

Recommended: Putty knife, paint scraper, sandpaper, sanding block, sanding sponge. Applicable areas of building: All areas.

For use on: Class I, Class Il, and Class Ill conditions.

Health/ Safety factors: Take precautions against lead dust, eye damage; dispose of lead paint residue properly.

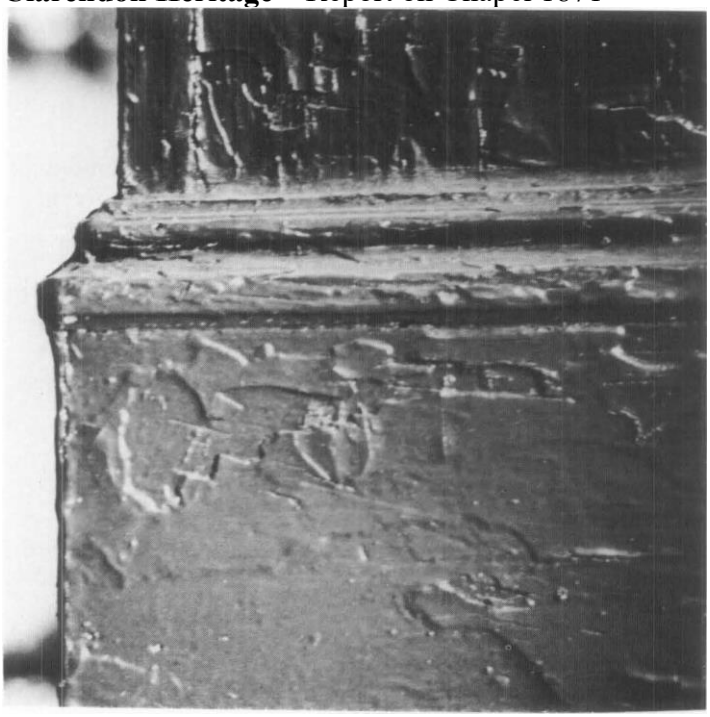

Fig. 10 An excellent example of inadequate scraping before repainting, the problems here are far more than cosmetic. This improperly prepared surface will permit moisture to get behind the paint film which, in turn, will result in chipping and peeling. Photo: Baird M. Smith, AIA.

• Abrasive Methods (Mechanical)
If hand sanding for purposes of surface preparation has not been productive or if the affected area is too large to consider hand sanding by itself, mechanical abrasive methods, i.e., power-operated tools may need to be employed; however, it should be noted that the majority of tools available for paint removal can cause damage to fragile wood and must be used with great care.

Recommended Abrasive Methods (Mechanical)
Orbital sander: Designed as a finishing or smoothing tool— not for the removal of multiple layers of paint—the oribital sander is thus recommended when limited paint removal is required prior to repainting. Because it sands in a small diameter circular motion (some models can also be switched to a back-and-forth vibrating action), this tool is particularly effective for "feathering" areas where paint has first been scraped (see figure 11). The abrasive surface varies from about 3X 7 inches to 4 X 9 inches and sandpaper is attached either by clamps or sliding clips. A medium grit, open-coat aluminum oxide sandpaper should be used; fine sandpaper clogs up so quickly that it is ineffective for smoothing paint.

Belt sander: A second type of power tool—the belt sander— can also be used for removing limited layers of paint but, in this case, the abrasive surface is a continuous belt of sandpaper that travels at high speeds and consequently offers much less control than the orbital sander. Because of the potential for more damage to the paint or the wood, use of the belt sander (also with a medium grit sandpaper) should be limited to flat surfaces and only skilled operators should be permitted to operate it within a historic preservation project.

Fig. 11 The orbital sander can be used for limited paint removal, i.e., for smoothing flat surfaces after the majority of deteriorated paint has already been scraped off. Photo: Charles E. Fisher, Ill.

Not Recommended

Rotary Drill Attachments: Rotary drill attachments such as the rotary sanding disc and the rotary wire stripper should be avoided. The disc sander—usually a disc of sandpaper about 5 inches in diameter secured to a rubber based attachment which is in turn connected to an electric drill or other motorized housing—can easily leave visible circular depressions in the wood which are difficult to hide, even with repainting. The rotary wire stripper—clusters of

metals wires similarly attached to an electric drilltype unit—can actually shred a wooden surface and is thus to be used exclusively for removing corrosion and paint from metals.
Waterblasting: Waterblasting above 600 p.s.i. to remove paint is not recommended because it can force water into the woodwork rather than cleaning loose paint and grime from the surface; at worst, high pressure waterblasting causes the water to penetrate exterior sheathing and damages interior finishes. A detergent solution, a medium soft bristle brush, and a garden hose for purposes of rinsing, is the gentlest method involving water and is recommended when cleaning exterior surfaces prior to repainting.
Sandblasting: Finally—and undoubtedly most vehemently ,not recommended"—sandblasting painted exterior woodwork will indeed remove paint, but at the same time can scar wooden elements beyond recognition. As with rotary wire strippers, sandblasting erodes the soft porous fibers (spring wood) faster than the hard, dense fibers (summer wood), leaving a pitted surface with ridges and valleys. Sandblasting will also erode projecting areas of carvings and moldings before it removes paint from concave areas (see figure 12). Hence, this abrasive method is potentially the most damaging of all possibilities, even if a contractor promises that blast pressure can be controlled so that the paint is removed without harming the historic exterior woodwork. (For Additional Information, See Presevation Briefs 6, "Dangers of Abrasive Cleaning to Historic Buildings".)
Summary of Abrasive Methods (Mechanical) Recommended: Orbital sander, belt sander (skilled operator only).
Applicable areas of building: Flat surfaces, i.e., siding, eaves, doors, windowsills.
For use on: Class Il and Class Ill conditions. Health/ Safety factors: Take precautions against lead dust and eye damage; dispose of lead paint residue properly.
Not Recommended: Rotary drill attachments, high pressure waterblasting, sandblasting.

Fig. 12 Sandblasting has permanently damaged this ornamental bracket. Even paint will not be able to hide the deep erosion of the wood. Photo: David W. Look, AIA.

• Thermal Methods
Where exterior surface conditions have been identified that warrant total paint removal such as peeling, cracking, or alligatoring, two thermal devices—the electric heat plate and the electric heat gun—have proven to be quite successful for use on different wooden elements of the historic building. One thermal method—the blow torch—is not recommended because it can scorch the wood or even burn the building down!

Recommended Thermal Methods Electric heat plate: The electric heat plate (see figure 13) operates between 500- and 800-degrees Fahrenheit (not hot enough to vaporize lead paint), using about 15 amps of power. The plate is held close to the painted exterior surface until the layers of paint begin to soften and blister, then moved to an adjacent location on the wood while the softened paint is scraped off with a putty knife (it should be noted that the heat plate is most successful when the paint is very thick!). With practice, the operator can successfully move the heat plate evenly across a flat surface such as wooden siding or a windowsill or door in a continuous motion, thus lessening the risk of scorching the wood in an attempt to réheat the edge of the paint sufficiently for effective removal. Since the electric heat plate's coil is "red hot," extreme caution should be taken to avoid igniting clothing or burning the skin. If an extension

cord is used, it should be a heavy-duty cord (with 3-prong grounded plugs). A heat plate could overload a circuit or, even worse, cause an electrical fire; therefore, it is recommended that this implement be used with a single circuit and that a fire extinguisher always be kept close at hand.

Fig. 13 The electric heat plate (with paint scraper) is particularly useful for removing paint down to bare wood on flat surfaces such as doors, window frames, and siding. After scraping, some light sanding will probably be necessary to smooth the surface prior to application of primer and top coats. Photo: David W. Look, AIA.

Electric heat gun: The electric heat gun (electric hot-air gun) looks like a hand-held hairdryer with a heavy-duty metal case (see figure 14). It has an electrical resistance coil that typically heats between 500 and 750 degrees Fahrenheit and, again, uses about 15 amps of power which requires a heavy-duty extension cord. There are some heat guns that operate at higher temperatures but they should not be purchased for removing old paint because of the danger of lead paint vapors. The temperature is controlled by a vent on the side of the heat gun. When the vent is closed, the heat increases. A fan forces a stream of hot air against the painted woodwork, causing a blister to form. At that point, the softened paint can be peeled back with a putty knife. It can be used to best advantage when a paneled door was originally varnished, then painted a number of times. In this case, the paint will come off quite easily, often leaving an almost pristine varnished surface behind. Like the heat plate, the heat gun works best on a heavy paint build-up. (It is, however, not very successful on only one or two layers of paint or on surfaces that have only been varnished. The varnish simply becomes sticky and the wood scorches.) Although the heat gun is heavier and more tiring to use than the heat plate, it is particularly effective for removing paint from detail work because the nozzle can be directed at curved and intricate surfaces. Its use is thus more limited than the heat plate, and most successfully used in conjunction with the heat plate. For example, it takes about two to three hours to strip a paneled door with a heat gun, but if used in combination with a heat plate for the large, flat area, the time can usually be cut in half. Although a heat gun seldom scorches wood, it can cause fires (like the blow torch) if aimed at the dusty cavity between the exterior sheathing and siding and interior lath and plaster. A fire may smolder for hours before flames break through to the surface. Therefore, this thermal device is best suited for use on solid decorative elements, such as molding, balusters, fretwork, or "gingerbread."

Not Recommended

Blow Torch: Blow torches, such as hand-held propane or butane torches, were widely used in the past for paint removal because other thermal devices were not available. With this technique, the flame is directed toward the paint until it begins to bubble and loosen from the surface. Then the paint is scraped off with a putty knife. Although this is a relatively fast process, at temperatures between 3200 and 3800 degrees Fahrenheit the open flame is not only capable of burning a careless operator and causing severe damage to eyes or skin, it can easily scorch or ignite the wood. The other fire hazard is more insidious. Most frame buildings have an air space between the exterior sheathing and siding and interior lath and plaster. This cavity usually has an accumulation of dust which is also easily ignited by the open flame of a blow torch. Finally, lead-base paints will vaporize at high temperatures, releasing toxic fumes that can be unknowingly inhaled. Therefore, because both the heat plate and the heat gun are generally safer to use—that is, the risks are much more controllable—the blow torch should definitely be avoided!

Fig. 14 The nozzle on the electric heat gun permits hot air to be aimed into cavities on solid decorative elements such as this applied column. After the paint has been sufficiently softened, it can be removed with a profiled scraper. Photo: Charles E. Fisher, 111.

Summary of Thermal Methods
Recommended: Electric heat plate, electric heat gun.
Applicable areas of building: Electric heat plate—flat surfaces such as siding, eaves, sash, sills, doors. Electric heat gun—solid decorative molding, balusters, fretwork, or
"gingerbread. "
For use on: Class Ill conditions.
Health/ Safety factors: Take precautions against eye damage and fire. Dispose of lead paint residue properly. Not Recommended: Blow torch.

- **Chemical Methods**

With the availability of effective thermal methods for total paint removal, the need for chemical methods—in the context of preparing historic exterior woodwork for repainting—becomes quite limited. Solvent-base or caustic strippers may, however, play a supplemental role in a number of situations, including:

- Removing paint residue from intricate decorative features, or in cracks or hard to reach areas if a heat gun has not been completely effective;
- Removing paint on window muntins because heat devices can easily break the glass;
- Removing varnish on exterior doors after all layers of paint have been removed by a heat plate/ heat gun if the original varnish finish is being restored;
- Removing paint from detachable wooden elements such as exterior shutters, balusters, columns, and doors by dip-stripping when other methods are too laborious.

Recommended Chemical Methods
(Use With Extreme Caution)

Because all chemical paint removers can involve potential health and safety hazards, no wholehearted recommendations can be made from that standpoint. Commonly known as "paint removers" or "strippers," both solvent-base or caustic products are commercially available that, when poured, brushed, or sprayed on painted exterior woodwork are capable of softening several layers of paint at a time so that the resulting "sludge"—which should be remembered is nothing less than the sequence of historic paint layers—can be removed with a putty knife. Detachable wood elements such as exterior shutters can also be "dip-stripped."
Solvent-base Strippers: The formulas tend to vary, but generally consist of combinations of organic solvents such as methylene chloride, isopropanol, toluol, xylol, and methanol; thickeners such as methyl cellulose; and various additives such as paraffin wax used to prevent the volatile solvents from evaporating before they have time to soak through multiple layers of paint. Thus, while some solvent-base strippers are quite thin and therefore unsuitable for use on vertical surfaces, others, called "semipaste" strippers, are formulated for use on vertical surfaces or the underside of horizontal surfaces.
However, whether liquid or semi-paste, there are two important points to stress when using any solvent-base stripper: First, the vapors from the organic chemicals can be highly toxic if inhaled; skin contact is equally dangerous because the solvents can be absorbed; second, many solvent-base strippers are flammable. Even though application out-of-doors may somewhat mitigate health and safety hazards, a respirator with special filters for organic solvents is recommended and, of course, solvent-base strippers should never be used around open flames, lighted cigarettes, or with steel wool around electrical outlets.

Although appearing to be the simplest for exterior use, a particular type of solvent-base stripper needs to be mentioned here because it can actually cause the

most problems. Known as "water-rinsable," such products have a high proportion of methylene chloride together with emulsifiers. Although the dissolved paint can be rinsed off with water with a minimum of scraping, this ultimately creates more of a problem in cleaning up and properly disposing of the sludge. In addition, these strippers can leave a gummy residue on the wood that requires removal with solvents. Finally, water-rinsable strippers tend to raise the grain of the wood more than regular strippers.

On balance, then, the regular strippers would seem to work just as well for exterior purposes and are perhaps even better from the standpoint of proper lead sludge disposal because they must be hand ;craped as opposed to rinsed off (a coffee-can with a wire stretched across the top is one effective way to collect the sludge; when the putty knife is run across the wire, the sludge simply falls into the can. Then, when the can is filled, the wire is removed, the can capped, and the lead paint sludge disposed of according to local health regulations).

Caustic Strippers: Until the advent of solvent-base strippers, caustic strippers were used exclusively when a chemical method was deemed appropriate for total paint removal prior to repainting or refinishing. Now, it is more difficult to find commercially prepared caustic solutions in hardware and paint stores for home-owner use with the exception of lye (caustic soda) because solvent-base strippers packaged in small quantities tend to dominate the market.

Most commercial dip stripping companies, however, continue to use variations of the caustic bath process because it is still the cheapest method available for removing paint. Generally, dip stripping should be left to professional companies because caustic solutions can ing sent out[6] for stripping in a caustic solution, it is wise to see samples of the company's finished work. While some companies do a first-rate job, others can leave a residue of paint in carvings and grooves. Wooden elements may also be soaked too long so that the wood grain is raised and roughened, requiring extensive hand sanding later. In addition, assurances should be given by these companies that caustic paint removers will be neutralized with a mild acid solution or at least thoroughly rinsed with water after dipping (a caustic residue makes the wood feel slippery). If this is not done, the lye residue will cause new paint to fail.

Summary of Chemical Methods

Recommended, with extreme caution: Solvent-base strippers, caustic strippers.

Applicable areas of buildings: decorative features, window muntins, doors, exterior shutters, columns, balusters, and railings.

For use on: Class Ill Conditions.

Health/ Safety factors: Take precautions against inhaling toxic vapors; fire; eye damage; and chemical poisoning from skin contact. Dispose of lead residue properly

General Paint Type Recommendations

Based on the assumption that the exterior wood has been painted with oil paint many times in the past and the existing top coat is therefore also an oil paint, * it is recommended that for CLASS I and CLASS Il paint surface conditions, a top coat of high quality oil paint be applied when repainting. The reason for recommending oil rather than latex paints is that a coat of latex paint applied directly over old oil paint is more apt to fail. The considerations are twofold. First, because oil paints continue to harden with age, the old surface is sensitive to the added stress of shrinkage which occurs as a new coat of paint dries. Oil paints shrink less upon drying than latex paints and thus do not have as great a tendency to pull the old paint loose. Second, when exterior oil paints age, the binder releases pigment particles, causing a chalky surface. Although for best results, the chalk (or dirt, etc.) should always be cleaned off prior to repainting, a coat of new oil paint is more able to penetrate a chalky residue and adhere than is latex paint. Therefore, unless it is possible to thoroughly clean a heavy chalked surface, oil paints—on balance—give better adhesion.

If however, a latex top coat is going to be applied over several layers of old oil paint, an oil primer should be applied first (the oil primer creates a flat, porous surface to which the latex can adhere). After the primer has thoroughly dried, a latex top coat may be applied. In the long run, changing paint types is more time consuming and expensive. An application of a new oil-type top coat on the old oil paint is, thus, the preferred course of action.

6 Marking the original location of the shutter by number (either by stamping numbers into the end grain with metal numeral dies or cutting numbers into the end with a pen knife) will minimize difficulties when rehanging them.

*If the top coat is latex paint {when viewed by the naked eye or, preferably, with a magnifying glass, it looks like a series of tiny craters} it may either be repainted with new latex paint or with oil paint. Normal surface preparation should precede any repainting

If CLASS III conditions have necessitated total paint removal, there are two options, both of which assure protection of the exterior wood: (1) an oil primer may

be applied followed by an oil-type top coat, preferably by the same manufacturer; or (2) an oil primer may be applied followed by a latex top coat, again using the same brand of paint. It should also be noted that

primers were never intended to withstand the effects of weathering; therefore, the top coat should be applied as soon as possible after the primer has dried.

Conclusion

The recommendations outlined in this Brief are cautious because at present there is no completely safe and effective method of removing old paint from exterior woodwork. This has necessarily eliminated descriptions of several methods still in a developmental or experimental stage, which can therefore neither be recommended nor precluded from future recommendation. With the everincreasing number of buildings being rehabilitated, however, paint removal technology should be stimulated and, in consequence, existing methods refined and new methods developed which will respect both the historic wood and the health and safety of the operator.

Reading List

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This publication has been prepared pursuant to The Economic Recovery Tax Act of 1981, which directs the Secretary of the Interior to certify rehabilitations of historic buildings that are consistent with their historic character; the advice and guidance in this brief will assist property owners in complying with the requirements of this law.

Preservation Briefs 10 has been developed under the technical editorship of Lee H. Nelson, AIA, Chief, Preservation Assistance Division, National Park Service, U.S. Department of the Interior, Washington, D.C. 20240. Comments on the usefulness of this information are welcomed and can be sent to Mr. Nelson at the above address.

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Fundraising Efforts

Websites

ClarendonHeritage.org

Chapel1871.org

Thanksgiving Holiday Market

Christmas Candle Ceremony

Future

Thanksgiving Program

Weekly Coffee Hour

Store fundraising merchandise

Historical Exhibit Museum

Music Performance with tickets