Naval Facilities Engineering Command
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HISTORIC STRUCTURES PRESERVATION MANUAL

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FOREWORD

The Navy has a responsibility to develop appropriate plans for maintenance of historic resources and provide documentation for alteration or disposal of these resources. Each shore activity must ensure that the legal requirements of historic resource preservation programs and the spirit of those requirements are met for all existing and potential historic resources.

This manual is provided to help all shore activities protect the historic properties they own or control. Activities are required to establish and implement a program to identify, inventory, and nominate to the Secretary of the Interior every resource that appears to meet the eligibility criteria for listing on the National Register of Historic Places. Activities are required to see that their historic resources are not inadvertently sold, demolished, moved, substantially altered, or allowed to deteriorate significantly.

Additional information or suggestions that will improve this manual are invited and should be submitted through appropriate charnels to the Naval Facilities Engineering Command, (Attention: Code 20Y), 200 Stovall Street, Alexandria, VA 22332-2300.

This publication has been reviewed in accordance with the Secretary of the Navy Instruction 5600.16A and is certified as an official publication of the Naval Facilities Engineering Command.

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ABSTRACT

This publication provides a working awareness of historic preservation policies and procedures to be followed by Navy activities. The primary focus is to provide Navy Public Works personnel with the necessary information for properly identifying, preserving, and maintaining historic resources.

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CHAPTER 1. INTRODUCTION

1.1 PURPOSE AND RESPONSIBILITY. The purpose of this manual is to provide a working awareness of historic preservation policies and procedures to be followed by U.S. Navy activities. The primary focus is to provide Navy Public Works personnel with the necessary information for properly identifying, preserving, and maintaining historic resources. This manual will provide guidance on statutes, laws, and regulations from federal and state offices, attempting to coordinate the sometimes confusing interrelationships among federal, state, and local requirements. This information should be used as a guide for appropriate cultural resources management.

1.2 RESPONSIBLE PARTICIPANTS (NAVY).

1.2.1 Chief of Naval Operations (CNO). CNO, through OP-44E, is responsible for providing policy and procedural guidance for the Navy-wide Historic and Archeological Resources Protection (HARP) Program.

1.2.2 Commander, Naval Facilities Engineering Command (NAVFACENGCOM). NAVFACENGCOM is the technical advisor to CNO for historic resource issues. Additionally, NAVFACENGCOM is responsible for coordinating with local commands to ensure compliance with historic resource preservation programs. This includes validating Military Construction, Navy (MILCON), documentation that affects current or potential historic or archeological sites and coordinating with federal and/or state agencies, as appropriate.

1.2.3 Engineering Field Division (EFD). The NAVFAC EFDs are responsible for working with field activities to ensure legal compliance with historic resource preservation programs. In doing so, they are often the liaison between activities and federal and state agencies. EFDs are also the custodians of the Naval Facilities Assets Data Base (NFADB), which is the Navy-wide listing of resources of (or potentially of) historic or cultural value.

1.2.4 Public Works Centers (PWC)/Public Works Departments (PWD) As technical representatives to activity Commanding Officers, PWCs and PWDs develop appropriate plans for maintenance of historic resources and provide documentation for alteration or disposal of these resources. PWCs and PWDs must be knowledgeable of historic preservation policies and requirements so that adequate information can be passed to EFDs or NAVFACENGCOM for the management of historic resources and preparation of project documentation. The activity, through familiarity with the local

historical resources, is the prime advocate for front line historic and archeological resource management.

1.2.5 Shore Activity. The activity is the first line of responsibility in the identification and preservation of historic resources. The activity Commanding Officer is personally responsible for ensuring that the legal requirements of historic resource preservation programs and the spirit of those requirements are met for all existing and potential historic resources under his jurisdiction.

1.3 RESPONSIBLE PARTICIPANTS (NON-NAVY).

1.3.1 Department of the Interior (DOI). Within DOI, the National Park Service (NPS) is responsible for administering historic and cultural resource programs, such as the National Register of Historic Places. An activity should use published NPS standards for maintenance and repair (or "rehabilitation" in preservationist's terms) of historic resources. The Navy is not in the business of "restoring" historic facilities. NPS also provides interagency archeological services that can be called upon by NAVFAC and its EFDs in providing assistance to shore activities.

1.3.2 Advisory Council on Historic Preservation (ACHP). The ACHP advises the President and Congress on historic preservation issues. The National Historic Preservation Act of 1966, amended in 1980, created this independent agency, which reviews Navy projects that may affect resources currently listed or eligible for listing on the National Register of Historic Places. The ACHP'S review normally follows coordination with the State Historic Preservation Officer (SHPO).

1.3.3 State Historic Preservation Officer. The SHPO is appointed by the governor of each state or U.S. territory to be the technical and administrative point of contact for historic preservation issues within the state. This applies to federal properties as well as state or territory properties. The SHPO is also available for advice and consultation on historic preservation issues. Coordination with the SHPO early in the planning process will mitigate delays in review. The Navy may involve the SHPO in the technical process of selecting experts and preparing scopes of work. The SHPO should be involved in any project that may affect a current or potential National Register property.

1.3.4 Environmental Protection Agency (EPA). The National Environmental Policy Act of 1969 was established to ensure the protection and enhancement of the environment. Through the act, EPA recognizes its part in ensuring preservation of the historic, cultural, and natural aspects of our national heritage.

1.3.5 Native Americans and Other Interested Publics. Section 106 of the National Historic Preservation Act requires the Navy to take into account the interests of certain other organizations and persons when planning activities that may affect historic properties. It is necessary to notify and seek information from such groups or persons and to allow them the opportunity to participate in the Section 106 review process. In particular, Indian tribes and other Native Americans often have concerns in historic preservation issues that extend beyond the lands they currently own (for instance, the interest of a relocated tribe in its ancestral homeland or the interest of a tribe in lands near its reservation that are no longer in Indian ownership) . The SHPO should be asked-for help in identifying such issues and groups. In addition, the Native American Grave Protection and Repatriation Act of 1990 (NAGPRA) establishes that Indian and Native Hawaiian artifacts and human remains that are discovered in the course of Navy activities are the property of the cultural group concerned. They must be properly inventoried and cared for by the Navy and returned to the cultural group concerned, if their return is requested. Advanced planning and coordination with Native American groups is essential to avoid or minimize work stoppages in such situations. Unless a Prior agreement has been made with the cultural group with which the remains or artifacts are associated, NAGPRA requires an immediate work stoppage of thirty days duration.

1.3.6 Local and Regional Preservation Associations. Local and regional associations can have a great deal of influence on historic preservation activities in their area. While they are not regulating bodies, they can direct public sentiment relative to any preservation projects within their jurisdiction. Therefore, it is beneficial to the Navy to work with local associations, as well as federal and state agencies, when planning projects that may affect historic resources.

1.4 PROCESS AND ACTIVITY RESPONSIBILITIES. All federal agencies are required by the National Historic Preservation Act (NHPA) of 1966, as amended in 1980, to protect the historic properties they own or control. Agencies are required to have and follow a program to identify, inventory, and nominate to the Secretary of the Interior every resource that appears to meet the eligibility criteria for listing on the National Register of Historic Places. Agencies are required to see that their historic resources are not inadvertently sold, demolished, moved, substantially altered, or allowed to deteriorate significantly.

At the earliest stages of planning, the Navy is expected to “take into account” any potential effects on its historic properties. The Navy provides to the ACHP for comment all plans, projects, or programs that are likely to affect resources listed or eligible for listing on the National Register.

In order to meet these requirements, the Navy:

- **Performs overview surveys to determine where and what sort of cultural and historic resources it has;**
- **Follows up, if necessary, with detailed surveys to gather basic data on the cultural resources it has located;**
- **Organizes the data into inventories in order to evaluate, in consultation with the SHPO, the significance of the cultural resources;**
- **Seeks a determination of eligibility for listing on the National Register;**
- **Nominates properties to the National Register;**
- **Studies the potential effect of any proposed undertakings on National Register properties;**
- **Submits its findings to the SHPO and the ACHP, as appropriate; and**
- **Carries out, modifies, or abandons the proposed undertaking and executes any required mitigation procedures.**

CHAPTER 2. HISTORIC AND ARCHEOLOGICAL RESOURCES MANAGEMENT

2.1 THE NATIONAL REGISTER OF HISTORIC PLACES. The National Register of Historic Places is the official list of the nation's cultural resources that are considered worthy of preservation. This list is constantly growing as more properties are identified that have the kinds of historical, architectural, cultural, or engineering significance in American history that makes them eligible for listing. The Navy's preservation activities are based on identifying and protecting the cultural resources under its control that are either listed on the National Register or eligible for listing.

2.1.1 Eligibility. When does "old" become "historic"? The National Park Service has developed a strict set of criteria that define the buildings, districts, structures, objects, and sites that can be considered for National Register listing. First, they must be significant in American history, architecture, engineering, archeology, or culture. Furthermore, they must possess integrity of location, design, setting, materials, workmanship, feeling, and association; that is, they must not have been altered, moved, damaged, or deteriorated to such an extent that they no longer display the qualities that made them significant in the first place. They also must:

- Be associated with events that have made a significant contribution to the broad patterns of our history;
- Be associated with the lives of persons significant in our past;
- Embody the distinctive characteristics of a type, period, method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or
- Have yielded, or be likely to yield, information on prehistory or history.

Exceptions to Criteria. There are properties that meet all these criteria but still do not qualify for Register listing. Ordinarily, cemeteries, birthplaces, or graves of historic figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature (like monuments), and properties that have achieved significance within the last 50 years are not considered eligible. However, these properties may be listed as integral parts of historic districts that meet the criteria. Although historic properties are most often designated

as historic districts (areas that usually contain a number of buildings, structures, sites, and objects), each component of the district must be studied individually and evaluated as being either a contributing or a non-contributing factor in the district.

There are also <u>exceptions to the exceptions</u>:

- A religious property that derives its primary significance from architectural or artistic distinction or historic importance;
- A building or structure that has been removed from its original location but is significant for architectural value or is the surviving structure associated with a historic person or event;
- A birthplace or grave of a historic figure if there is no other appropriate site or building directly associated with his or her productive life;
- A cemetery that derives its primary significance from graves of persons of transcendent importance, from distinctive design features, or from association with historic events;
- A reconstructed building, when accurately executed as part of a restoration master plan, and when no other building or structure with the same association has survived;
- A property, primarily commemorative, if design, age, tradition, or symbolic value has given it its own historic significance; and
- A property that has achieved significance within the past 50 years if it is of exceptional importance. An example of an exception to the 50-year rule is the Dunes International Airport terminal, near Washington, D.C., constructed in 1962. Designed by the architectural firm of Eero Saarinen and Associates, the terminal was considered to be of such outstanding architectural interest that it was declared eligible for listing on the Register in February 1978, only 16 years after it was built.

Other, possibly less glamorous, exceptions that may be of special concern are the World War II “temporary” buildings constructed on military bases between 1939 and 1946. A blanket demolition order was issued for these buildings by DOD in the early 1980s, but they are now protected by a special programmatic agreement (PA) . By definition in the PA, World War II temporary buildings are those built between 1939 and 1946 and currently classified in the NAVFAC P-164 (see Section 2.6) as “T”. World War II buildings originally built as temporary, but no longer classified as such, are not covered by the PA. The PA will

allow time to prepare a study of the history of military construction and to document selected examples. Once the documentation is completed, the Navy will have completed its ACHP Section 106 obligations, and no further preservation measures will be required for those World War II temporary buildings.

2.1.2 Nomination. The Secretary of the Navy is responsible for nominating historic properties that are located on Navy bases to the Secretary of the Interior for listing on the National Register. Each activity Commanding Officer is responsible for surveying the property under his\her control or jurisdiction, inventorying those properties which appear to qualify for the National Register, and initiating action to nominate such properties to the National Register. NAVFAC EFDs provide technical guidance in applying National Register criteria: in contracting out to qualified cultural resources professionals (archeologists or architectural historians, depending on the nature of the resource) , in consulting with the SHPO, in preparing documentation, and in reviewing nominations, and requests for determination of eligibility. COMNAVFACENGCOM reviews completed nominations and COMNAVFACENGCOM forwards the nominations to appropriate Navy signatories for transmittal to the Keeper of the National Register.

The nomination process begins with the survey and inventory mentioned above and requires consultation and cooperation with the SHPO. The nomination is prepared on NPS Form 10-900 in accordance with 36 CFR 60 guidelines and the NPS publication, National Register Bulletin 16: Guidelines for Completing National Register of Historic Places Forms. Since interpreting and applying the criteria for nomination to the National Register requires specialized expertise, the nominations are usually prepared by contract personnel as part of the survey and inventory contract.

When the Navy disagrees with the SHPO as to whether a property meets National Register criteria for listing, or when time is of the essence, a determination of eligibility may be sought from the Keeper of the National Register. This shortens the review time and does not require Navy chain-of-command review. The state and local review period remains the same (45 days) . Determination of eligibility does not automatically result in listing on the National Register and does not satisfy the Navy's responsibility to nominate significant properties to the National Register. However, properties determined eligible are afforded the same protection as listed properties, and they must be treated as though listed.

2.2 IDENTIFICATION\INVENTORY CLASSIFICATION\DOCUMENTATION. Each Navy activity is required to have a Historic and Archeological Resources Protection (HARP) Plan, to make it as easy and cost-efficient as possible to comply with the federal laws and regulations. The plan identifies potentially significant resources, evaluates eligibility for the National Register, and

suggests ways to mitigate adverse effects of undertakings impacting eligible resources. See the publication, Guidance for Preparing Historic and Archeological Resources Protection Plans at United states Navy Facilities, for general information on preparing and using the HARP Plan.

Overview Survey. A HARP Plan begins with an overview survey, carried out by a team of qualified professionals (at least one archeologist and one architectural historian), to identify an installation's National Register resources and/or areas of archeological potential. The team reviews the NAVFAC P-164 inventory for the base in addition to written histories and maps, visits local or regional libraries, and reviews state and federal lists of known archeological sites and historic buildings, structures, and objects. Based on field visits, they note all districts, buildings, structures, and objects that appear to be eligible for the National Register. They examine areas where development may have destroyed archeological remains and identify areas that seem likely to contain undisturbed remains. Just as important in a practical sense, they identify those areas and resources that are probably not of historic, architectural, or archeological significance.

2.2.1 Historic Property Inventory. An inventory is prepared listing all the resources (historic properties and archeological sites) on the installation that are currently on the National Register. The inventory also lists those that appear to be eligible for the Register.

2.2.2 Inventory Evaluation. Each item in the Historic Property Inventory is then reviewed and evaluated. Some of the considerations in this evaluation process are the importance, or significance, of the property to the history of the installation, locality, region or nation; the property's place in the preservation plan for the base; and the priority associated with the maintenance goals for the property.

2.2.3 National Resister Resource Treatment Categories. The Navy divides all of its cultural resources (that means every property listed in NAVFAC P-164 and every archeological site that is or may be eligible for the National Register) into three general categories that recognize varying levels of historical or architectural importance based on evaluation by qualified professionals. The HARP Plan for each facility spells out which buildings, structures, sites, districts, and objects have been placed in each category. Preservation actions, or "treatments", required may vary with the category. It is important to remember that resources can be assigned to these categories only by qualified professionals in consultation with the Navy. The purpose of the categorization system is to help local activity personnel achieve the goals in the HARP Plan and comply with Sections 106 and 110 of the National Historic Preservation Act in a cost-effective way.

CATEGORY I.

a. Basis for inclusion. Category I resources meet the National Register criteria and are classified by qualified professionals as being of outstanding historical, architectural, archeological, engineering, or cultural significance. Further, these resources have been evaluated as retaining their "integrity," i.e. , original and\or authentic period materials, design, and context.

b. Treatment. The most painstaking preservation treatment is applicable. Care must be taken to preserve significant exterior elements, as well as character-defining interior spaces and architectural elements that contribute to the historic or architectural significance. Window and door openings, roof lines, trim materials, and historic landscape features are often of special interest to preservationists. If the resource is a site, district, or object, take care to identify and preserve all significant features. Do not introduce incompatible new features.

Concentrate on repair rather than replacement of original materials when maintenance is performed. Repair of old building materials and architectural features is labor intensive, but life-cycle dollar cost is reasonable and it is a major contributor to preservation.

If repair is not possible and replacement becomes necessary, the new material should match the material being replaced in composition, design, color, texture, and other visual qualities. Modern substitute products and materials are not ordinarily compatible and in some cases they hasten deterioration of the original fabric.

Repair and replacement of architectural features should be based on detailed and accurate duplication of original features, substantiated by historical, physical, pictorial, or archeological evidence.

Maintenance and rehabilitation of Category I resources must be planned in accordance with The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitation of Historic Buildings (1983), The Secretary of the Interior's Standards for Historic Preservation Projects with Guidelines for Applying the Standards (1985), and the Navy Preservation Maintenance Manual.

Preserve all significant features of Category I sites, structures, districts, and objects, and take care not to introduce incompatible new features. Monitor regularly for any effects of natural deterioration, neglect, wear and tear, or abuse. Follow the procedures for Section 106 consultation to avoid adverse effects and develop appropriate corrective measures.

Preserve Category I archeological resources by leaving them untouched, in the ground. Disturbance of such resources should not be allowed except in two situations: (1) as part of archeological research conducted under an ARPA or Antiquities Act permit, or (2) as mitigation measures under an MOA, e.g., data recovery, when unavoidable adverse effects arise from a Navy undertaking.

CATEGORY II.

a. Basis for Inclusion: Category II resources meet the National Register criteria but are classified by qualified professionals as being of lesser historical, architectural, archeological, engineering, or cultural significance than resources included in Category I. They may not be able to match Category I properties in terms of integrity.

b. Treatment: The same preservation guidance applies, but there is somewhat more flexibility in application. Care must be taken to preserve those elements of historic buildings and structures which professional evaluation has designated as significant. Less stringent fidelity to detail may be tolerated than for Category I resources. Any changes introduced should be designed so that they can be reversed in the future, without permanent damage to the integrity of the resource.

A similarly serious, but flexible, approach applies to preservation of significant features of Category II sites, structures, districts, and objects. Monitor regularly for effects of natural deterioration, neglect, wear and tear, or abuse. Follow the procedures for Section 106 consultation to avoid adverse effects and develop appropriate mitigation measures.

Repair is preferable to replacement of original materials when maintenance is needed. If repair is not possible or cost-effective, however, selected modern replacement products and materials are available. Maintenance and rehabilitation of Category II resources must be planned in accordance with The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitation of Historic Buildings (1983), The Secretary of the Interior's Standards for Historic Preservation Projects with Guidelines for Applying the Standards (1985), and the Navy Preservation Maintenance Manual.

Category II archeological resources are treated the same as those in Category I. They are best protected by leaving them untouched in the ground. Disturbance of such resources should not be allowed except in two situations: (1) as part of archeological research conducted under an ARPA or Antiquities Act permit, or,(2) as mitigation measures under an MOA, e.g., data recovery, when unavoidable adverse effects arise from a Navy undertaking.

CATEGORY III.

a. Basis for Inclusion. Category III includes resources that qualified professionals have concluded do not meet National Register eligibility criteria, as well as all World War II temporary buildings, and buildings in historic districts that have been professionally evaluated as non-contributing elements of the district. The first allocation of properties to this category occurs on the basis of professional judgments made during the Overview. Later allocations are made as potentially eligible resources are evaluated in intensive surveys and found not eligible for the National Register.

b. Treatment. Federal stewardship dictates proper maintenance of all Navy properties, but no special preservation measures are required, and no Section 106 compliance is necessary when dealing with Category III resources. Category III resources that are in close proximity to Category I and Category II resources should be treated sensitively, so that they do not produce any effect that triggers Section 106 obligations. Category III resources must be reevaluated periodically for National Register eligibility, in light of increasing age and changing cultural values and eligibility criteria. For example, as resources pass 50 years of age, they may be considered significant. It is recommended that professional reevaluation be scheduled to coincide with HARP Plan updates.

2.2.4 Sources of Information. The files of the SHPO may contain a great deal of information about specific historic properties on Navy bases, or they may provide few or no clues to significance. They should always be checked. Books on local or specialized history topics (such as those dealing with the development of industrial or military equipment and processes) often help to place the properties in context and to suggest other sources of information. Some rich sources of "primary" materials (the raw materials that historians use to write history) are base maps and old base repair records. The National Archives and Records Service in Washington, D. C., may have drawings, maps, or other useful records. In the Library of Congress, the Cartographic Division and the Prints and Photographs Division may be of help.

Specifically, the Prints and Photographs Division contains copies of measured drawings, photographs, and written data prepared by the Historic American Buildings Survey and Historic American Engineering Record (HABS\HAER) for selected Navy buildings.

Old photographs, which sometimes accompany construction completion reports, are invaluable records. Many Navy installations have one office that gathers, officially or unofficially, historic materials about the base.

Potential sources within the Navy for historic photographs are the local Public Works. Office, the local Public Affairs

Office, the NAVFAC Historical Archives at Port Hueneme, CA, and the Naval History Division at the Washington Navy Yard.

If the property has ever been in private ownership, it is important to look at insurance or real estate tax maps, deeds and wills recorded in local courthouses, building and repair permits, and newspaper records. Most community libraries have local history departments, with knowledgeable and helpful staffs, who ought to be consulted.

2.3 ADAPTIVE USE PLAN. It is Navy policy to preserve its cultural resources (that is, to maintain them in their original or existing condition), rather than to restore them (that is, to return them to their appearance during some earlier historical period). Good, routine maintenance is the essence of preservation. However, it also often happens that structures with important historic or architectural aspects must be modified in order to meet new space or use requirements. With careful planning, this can almost always be done without sacrificing historic aspects of the facility. And, since the life cycle of a historic facility is so long, it is usually economically worthwhile to use methods and materials that are approved for use on historic buildings when repair or replacement is needed.

2.3.1 Alterations, Additions, Demolition. Partial Demolition, and Disposition. The following list is condensed from DOI information to serve as a guide to planning work on a historic facility:

- Reasonable effort should be made to identify compatible uses within a facility.
- Distinguishing characteristics should not be destroyed.
- Historic material or features should be left alone.
- Recognize buildings as being of their own time. Alterations that attempt to recreate a previous appearance, without the alteration being of itself historic, should be avoided.
- Previous alterations to building's may have their own significance and should be recognized and respected.
- Distinctive style or craftsmanship should be treated with sensitivity.
- Repair features first, then replace with a suitable material that matches visual qualities. Architectural features should be duplicated as nearly as possible from photos, drawings, or other verifiable means rather than guessing or using nearby buildings as a go-by.

- o Cleaning should use the gentlest means possible to get the job done.

- o Every reasonable effort should be made to preserve archeological resources at or near any project.

- o Additions of an appropriate contemporary design are acceptable if they do not destroy the essence of the historic resource.

- o Alterations should be designed to allow their removal at the end of the life cycle. This removal should not damage the essence of the historic resource.

- o Demolition of historic resources, or moving of archeological resources, should be coordinated with the SHPO and the ACHP. The minimum action will be formal documentation of the significant asset as it sits in place.

- o In some instances, partial demolition is appropriate when an alteration of no historic significance is hiding a more significant feature. Again, coordination with the SHPO will generate good feedback on properly executing the work.

2.3.2 Mitigating. The basic legal requirement of Section 106 of the NHPA is for the Navy to "take into account" in the early stages of planning, prior to approval for expenditure of project funds, what effect its actions might have on National Register resources (listed or eligible for listing) and to afford the ACHP a reasonable opportunity for review. When it is determined that an undertaking will have adverse effects on a historic resource, mitigation measures should be developed to lessen the impact of the undertaking to the point where it is an acceptable price to pay for the benefits of the undertaking.

2.3.3 Appropriateness/Design Issues. The design solutions chosen for additions, modifications, and demolitions to (and near) a historic or archeological resource, should exhibit the same enduring style as the significant resource. Sensitivity and consideration are of key importance.

2.3.4 Sites, Outbuildings, Grounds. These historic properties typically require little or no maintenance as they are lesser developed resources than the primary historic property. These types of properties may be an undeveloped site within a historic district, a shack or building on or adjacent to a historic property, or the grounds surrounding a historic building. The objective in maintaining these properties is to protect and preserve the distinctive features and materials of grounds, sites, outbuildings, and other elements that might be an important part of the property's history and development.

2.4 ARCHEOLOGICAL SITE PROTECTION WORK PROCEDURES. Unless there is an archeologist assigned to the staff, most activities will need help with developing plans and procedures involving archeological resources. These experts, meeting the minimum qualifications for supervisors of federal agency-related field work as published at 36 CFR 61, can be enlisted through the EFD and the SHPO. The main point of these procedures is to give all due consideration to the methods that will preserve properties in place. Relocation of artifacts and human remains should be done only under the supervision of qualified professionals. Remember to handle archeological materials with care and human remains with the respect befitting any deceased person.

In planning archeological site protection, plan flexibly since unexpected data or materials may be encountered; for example, layering of artifacts, cemeteries, or architectural remains.

Ensure that inadvertently discovered archeological resources are protected at the site of discovery until the DOI Consulting Archeologist and the SHPO have been notified and cultural resource professionals have evaluated their significance and advised regarding necessary protection or recovery.

Activities will need to provide for proper storage and professional curation of salvaged archeological resources. Storage of records will be necessary in carrying out legal compliance actions.

Where the property cannot practically be preserved in place, and the Navy must destroy or damage the resource without data recovery, the ACHP Executive Director can be expected to not support or sanction recovery of the material simply because it exists. Nor can the Director support arbitrary destruction of data. Get approvals, following Section 106 procedures, prior to starting to work.

2.5 ACTIVITY MASTER PLAN AND BASE EXTERIOR ARCHITECTURE PLAN (BEAP). The activity Master Plan should positively identify all historic and archeological resources and incorporate, by reference, the activity HARP Plan. It will also provide additional archival material for future reference relevant to past and potential undertakings involving historic resources. The issues to include are:

- Location of resources, except in the case of archeological sites in danger of vandalism or looting;
- Description;
- Current condition;
- Preservation plans;

- o Encroachment, demolition, or enhancement plans to the resources by project or administrative programs;
- o A synopsis of the significance of the resource;
- o Memoranda of Agreement (MOA); and
- o Programmatic Agreements.

The BEAP is a more specific type of plan (often referenced through the Master Plan) that includes strategies for the exterior qualities of architecture on a base. Flagged in this document, should be plans that address actual or potential National Register resources and explain how the significance will be preserved. Statements and maps showing sites or districts within a base are typically considered; however, a base should also consider its relation to any nearby non-Navy sites or districts that may be affected. This is of particular importance for areas around airfields, where the noise may be detrimental to older structures or fixtures.

2.6 NAVAL FACILITIES ASSETS DATA BASE (NFADB; NAVFAC P-78) AND DETAILED INVENTORY OF SHORE FACILITIES (NAVFAC P-164). The NFADB is a management tool created by the Department of the Navy to meet DOD facilities inventory, planning, and management information requirements. Operated under the procedures of the NFADB Management System (MS), as detailed in NAVFAC P-78, this automated data base contains a file on each existing facility (building, structure, utility, and land) owned or leased by the Department of the Navy. Data is provided on each facility's location, acquisition, and condition. The data element, HISTORIC INDICATOR, for each entry in the NFADB can be used to identify whether an asset is historically significant (either by its own merit or because it is in the vicinity of a historic property) as well as the relative degree of historic significance of the property.

NAVFAC P-164, Detailed Inventory of Naval Shore Facilities, generated from the NFADB, is a single listing of all Navy-owned and leased Class 1 (land) and Class 2 (buildings, structure, and utilities) properties. When initiating a project, planners and estimators can use NAVFAC P-164 to determine the potential for affecting a historic property or resource.

CHAPTER 3. MAINTENANCE PLANNING

3.1 LONG-RANGE HISTORIC RESOURCE MAINTENANCE PLANNING. The key to good maintenance of historic buildings is a long-range maintenance plan. Long-range planning recognizes a responsibility to the future to prolong the useful life of a building by preserving it in its present condition and preventing or slowing deterioration and damage from natural or other causes.

Designing a good maintenance plan for a historic building is not hard, but it does require some thought. For instance, it requires being aware of the specific architectural character of the building. Every historic building has certain "character-defining" architectural features and building elements--its doors, windows, roofs, and ornamental detailing are obvious ones. These elements tell us much about when it was built and why, and sometimes even who designed it and for whom it was built. When such features are lost or changed, the building is said to have lost its architectural or historic integrity. Its essential character is gone. It may still be a good, useful, and even beautiful building, but it is no longer the same building.

Standard modern repair and maintenance techniques and materials are often acceptable for use on historic buildings, but they sometimes do more harm than good. Using the wrong materials or methods to maintain or repair (or, when necessary, replace) important features can destroy the integrity of the building and may even shorten its useful life. Each case must be carefully thought through. The earlier the planning takes place, the more likely it is to have a good effect.

An experienced preservation architect may usefully be brought in from outside the government to assist with scoping, plan review, specification writing and construction supervision. This may be accomplished by means of an Indefinite Quantity Contract, or in some instances through the good offices of the American Institute of Architects, which can sometimes arrange for professional volunteers or at least minimum cost assistance.

Historic Structure Report. A historic structure report is the best place to begin in setting up a long-range maintenance plan. The report is a thorough analysis of the existing structure by a specialist in the field of historic preservation. It should:

- Record the existing condition of the structure;

- Point out which materials and which features of the building are original and which ones date from later repairs; alterations, or additions (building materials and features are often referred to as the "fabric" of the building);

- Identify both original and early (over 50 years old) building elements, in order to avoid unintentional future changes to historic fabric;

- Identify structural or environmental conditions that may contribute to deterioration; and

- Provide information from which to develop a schedule of regular maintenance procedures.

Buildings deteriorate because of physical, chemical, or biological factors, or a combination of all three. Some of these factors were built into the structure itself, as a natural result of design or building materials chosen. Others come from environmental factors such as temperature, sunlight, humidity, or mechanical equipment vibrations. Chemical pollutants in the air or solvents used in normal cleaning processes can gradually dissolve or break down building materials. Vegetation, insects, or vermin may take advantage of these conditions and do further damage. A well-planned maintenance program makes it possible to monitor and control conditions in the building in order to slow down deterioration and delay the need for replacement or repair, as well as to predict future problems.

A good maintenance program identifies all the present causes of deterioration, predicts problems that are likely to come up in the future, and sets up an effective treatment program for the entire structure.

Other Sources of Help in Maintenance Planning. In addition to the historic structure report, accurately measured architectural drawings and photographs are helpful to record the original fabric of the building, later alterations, and the present physical conditions. These records are sometimes available from other federal agencies, such as the National Archives and Records Service, the National Park Service (the Historic American Buildings Survey), or the Library of Congress; from the SHPO; or from local or regional archives in libraries and historic or preservation societies. Current drawings and photographs may be needed to supplement historic data.

Building Use and Maintenance Priorities. Maintenance priorities must take into consideration the building's use. A building used by the public will face higher levels of stress and different threats to its historic integrity than one used as a private residence.

Special Considerations. Even on military facilities, maintenance planning may need to include protection from vandalism and control of tourist traffic, which can speed Up normal deterioration. Exposed surfaces in high-traffic areas such as stairs and hallways may need extra protection from wear and tear, as well as from fire and vandalism. It may be necessary to establish visitor traffic patterns to reduce structural strains.

Maintenance Scheduling. Maintaining an older building is not necessarily complicated or expensive. (In fact, it is usually much cheaper than rehabilitating or demolishing it.) However, some maintenance and repair procedures require prolonged testing before they are implemented, and they should not be done hastily. Delivery schedules for special supplies or replacement materials need advance planning. A realistic maintenance schedule will allow for all these factors.

Inspections. Careful, systematic inspection of existing conditions at regular intervals can be used to predict the rate of deterioration and the timing of necessary repairs. Control of existing problems can delay the need for repair and replacement. Continuous monitoring can verify the initial analysis and provide further information on rates of decay.

How often inspections and maintenance procedures need to be done will vary, depending on the materials and methods of construction, the age of specific building components, and the stresses placed on the building by its use and environment.

Training and Supervision. It is vital for maintenance workers to understand and appreciate the importance of historic structures and any original materials that still remain. Their enthusiasm can spell the difference between long life and early decay for these important resources. But workers also need to be trained in the care of old buildings, to ensure that repairs and maintenance will be done by qualified persons using the best methods possible. An alert supervisor will find many training opportunities for interested staff members; for example, specialized publications and workshops in specific maintenance techniques for historic buildings organized by historic preservation agencies and organizations. Encouraging and training even one preservation maintenance "specialist" can pay big dividends. A maintenance manual that details materials and methods to be used, an outline schedule of regular routine procedures, and time and budget allotments is essential to keeping maintenance on track. (See Figure 3-l.)

3.2 CONTROL INSPECTIONS. Inspection is the first step in identifying deficiencies; it provides the benchmark for starting maintenance work. Of the four types of inspections (operator, preventive maintenance, control, and specialized) the control inspection is performed by skilled planners who can recognize potential deficiencies and have the abilities to address problems

before they happen. The objective of the control inspection is to provide a baseline for a successful maintenance plan. The control inspection should describe the items of work in detail and assign them priorities. (See Figure 3-2.) Historic facilities, if they are properly maintained, should cyclically cost no more per year of life than non-historic facilities.

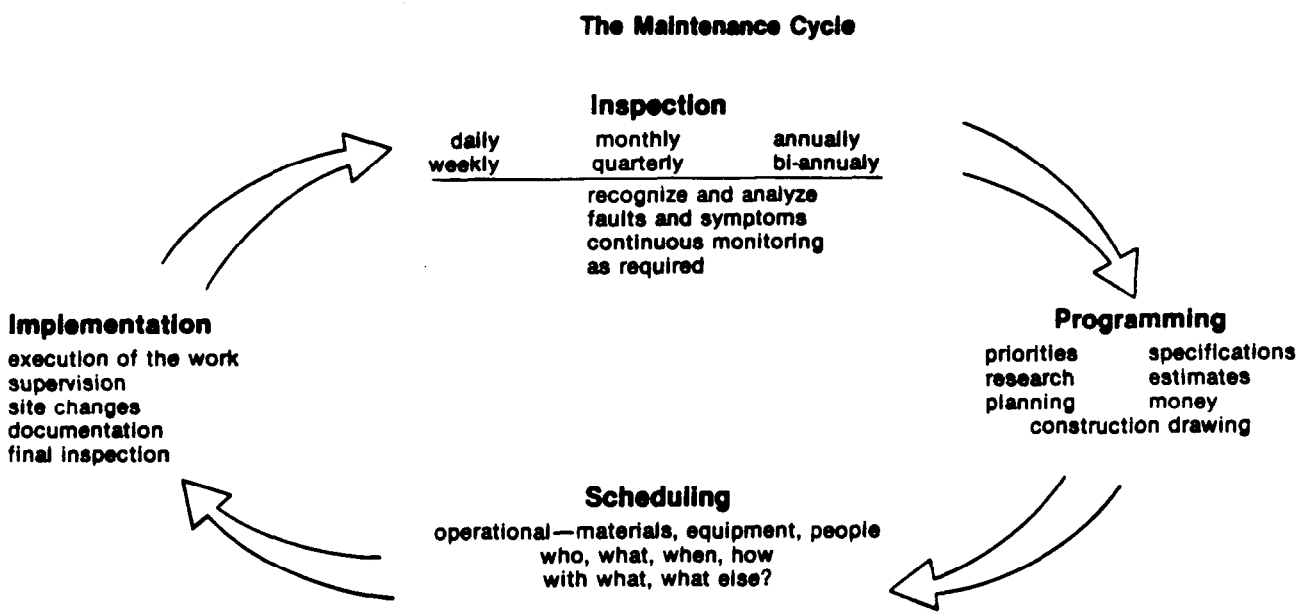


Figure 3-1. The Maintenance Cycle.

(Source: National Park Service, Technologies for Historic Preservation.)

While using the steps to doing control inspections presented in NAVFAC MO-321 and MO-322, it may be desirable to increase the length of time for inspection of older mechanical systems because of the potential for worn parts or material. The additional time gained by early detection will allow for replacement of equipment rather than crash repair. Advance planning for maintenance also may allow for consideration of more replacement alternatives than would be possible when performing emergency\breakdown maintenance.

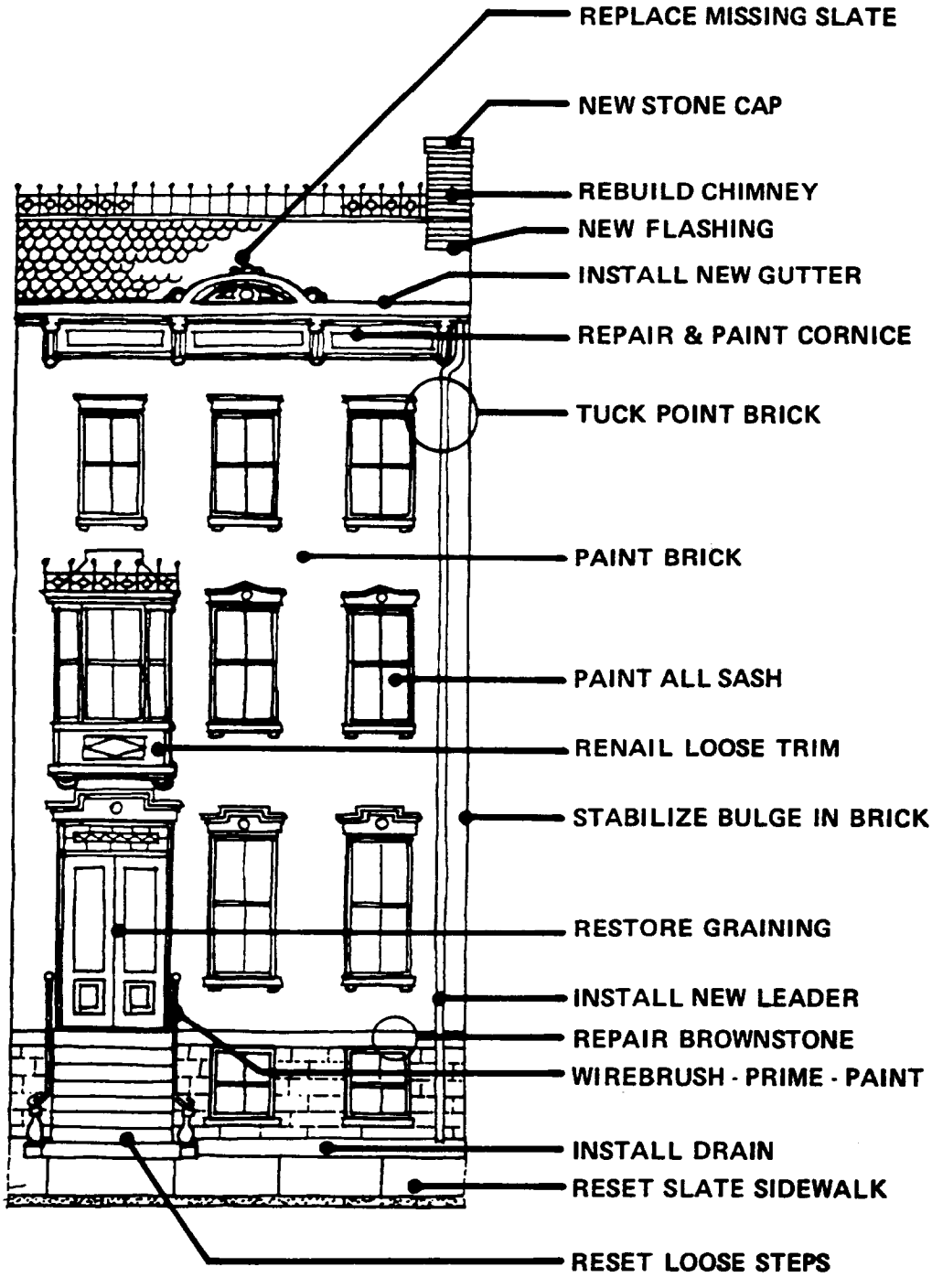


Figure 3-2. Typical Work Involved in Rehabilitating a Historic Structure.

(Source: Douglas Bucher, Preservation League of New York State)

3.3 LIFE-CYCLE COSTING. Life-cycle cost is the total cost of acquiring and owning an asset over its full life time. For a facility or property, it includes the costs of acquisition, development, maintenance, operation, support and, where applicable, disposal. The process is no different for a historic facility than a new facility, except that the life of a historic facility typically is "forever." Therefore, the purpose of an economic analysis for a historic resource is to decide which material or method will provide the best service “forever." Details on conducting life-cycle cost analyses can be found in NAVFAC P-442, Economic Analysis Handbook.

In a typical economic analysis, the three factors that limit the economic life of the resource are:

- Mission life, or the period over which a need for the resource is anticipated;
- Physical life, or the period over which the resource can be expected to last physically;
- Technological life, or the period before obsolescence would dictate replacement of the existing asset.

Under the preservation guidelines established for historic facilities, the mission life of the resource is "forever." The technological life of the resource is also a part of the historic fabric which will be preserved "forever." Therefore, the limiting economic factor for evaluating life cycle costs is the physical life of the resource. Many traditional, but expensive, building materials, such as copper, slate, or granite have unusually long lifetimes that may make them economically feasible for use in historic buildings which also have indefinite life expectancies.

One key to successful funding of historic facilities is to prioritize maintenance areas in terms of their maximum life benefit to an asset. Here is a guide:

- Roof,
- Exterior skin,
- Exterior finish coatings,
- High use spaces and surface (especially floors), and
- High use/high exposure wall areas.

3.4 BUILDING REGULATIONS. Building codes are intended to protect life and property by regulating the design and construction of buildings. They are written specifically for new building projects and modern construction practices. While local codes do not apply to military projects, it is Navy policy to provide at least equivalent protection for occupants of their buildings.

Since most historic buildings were constructed before the introduction of building codes, they often do not comply with

modern standards of safety and security, energy conservation, fire protection, or handicapped access. If strictly applied, standard codes may call for alterations that damage the historic or architectural character of a historic building.

Basically, building codes provide for two types of standards:

- Prescriptive standards spell out precisely what materials and methods of construction must be used to reach a particular safety goal. They concentrate on the means of making the building safe for people to live or work in.

- Performance standards specify the result to be achieved (i.e., the level of safety or protection) without giving rigid instructions about how to get there. They focus on the desired ends of safety planning. Generally, it is better to use performance standards for historic buildings, since they will allow greater flexibility in finding ways to protect both the historic structure and life and property. Life safety is always the most important consideration. However, considering the intent of building regulations may suggest ways to make the building safe for human occupancy without destroying its character.

For further information:

- Preservation and Building Codes. The Preservation Press, National Trust for Historic Preservation. Washington, DC, 1980.

- Rehabilitation Guidelines 1980, # 1. Guideline for Setting and Adopting Standards for Building Rehabilitation. National Institute of Building Sciences, U.S. Department of Housing and Urban Development, Washington, DC, 1980.

3.4.1 Fire and Life Safety. Complying with modern standards for fire and life safety may present the greatest challenge to successful preservation and continued use of historic buildings. To some degree most historic buildings fail to meet modern code requirements for materials, methods of construction, and exit systems.

The Life Safety Code determines the required number of exits based on the building's use and the number of occupants. Normally, there must be two widely separated, enclosed, and fire-protected means of exiting from any point in a building. Safe access must be provided to fire-protected vertical and horizontal circulation routes leading to the outside of the building. Following prescriptive standards might require enclosing existing open stairways, widening corridors or doorways, or reversing door swings. But these actions would change the historic appearance and architectural character of the building. Rethinking the problem in terms of performance

standards could lead to safe, workable alternatives that preserve the building. For instance, one or more new fireproof stair towers might be added in less visible locations.

Automatic fire detection and suppression systems can lower the risk caused by inadequate exit provisions or obsolete construction materials. However, the system should be carefully selected and installed in a way that will have as little impact as possible on the historic fabric of the structure.

"Archaic" building materials are those which are considered to have been out of general use for at least 30 years. They are not necessarily unsafe. Usually they have gone out of use for economic or technical reasons. Consulting older city or state construction codes or Rehabilitation Guidelines 1980: 8. Guidelines on Fire Ratings of Archaic Materials and Assemblies (U.S. Department of Housing and Urban Development, Office of Policy Development and Research; prepared by the National Institute of Building Sciences) can be helpful in assessing the safety performance of archaic materials and assemblies.

3.4.2 Health Hazards. Old buildings that appear to be in good condition may actually be hiding a variety of threats to the health of occupants and maintenance personnel. Becoming aware of these potential hazards is an important part of any safe and effective historic preservation maintenance program. The use of some building materials commonly found in older buildings, such as asbestos, is no longer allowed because the materials have been found to be dangerous to humans. Some restoration techniques use chemical or abrasive cleaners that have to be handled carefully in order not to create hazardous conditions. Old chimneys and flues that are blocked or left uncleaned may prevent ventilation from the heating system. Some old buildings are sealed so tightly with heavy insulation, weatherstripping, and vapor barriers that the indoor air quality is harmed by inadequate ventilation.

With sensible precautions, renovation and preservation maintenance procedures can be performed safely. Be alert to possible hazards; provide adequate ventilation, either natural or mechanical; and wear protective masks or clothing, as needed.

Before beginning any maintenance project, identify and analyze the potential level of risk from hazardous conditions within the structure. Samples of any doubtful materials found should be taken to a qualified laboratory for analysis.

Some of the more typical hazardous materials and their handling are discussed below:

- o Asbestos. Asbestos is a naturally occurring mineral that once was considered almost the ideal building material, but is now known to be dangerous to human health. Between 1890 and the early 1970s, it was commonly used as insulation in houses and in as many as 3,000 other

products, from spray-on fireproofing, sound proofing, piping and vessel insulation, vinyl asbestos floor tiles, ceiling tiles, and some types of shingles, to ironing board covers. When asbestos-containing materials become friable (that is, powdery or easily crumbled), dangerous asbestos fibers may be released into the air. The fibers can then be carried through the entire building by way of the ventilating system. Whenever the presence of asbestos is suspected, it should be reported and tested immediately. Coordinate with the base asbestos control program to determine treatment.

Asbestos can only be positively identified by laboratory tests of samples. There are some clues to watch for, however:

- Insulating coatings on old boilers: Off-white, smooth-surfaced, usually cracked.

- Cloth-wrapped steam and hot water pipe lagging, especially if the edges look like light-gray corrugated cardboard.

- Asbestos paper on heating pipes, forced-air ducting, beneath asphalt and linoleum flooring, behind kitchen wallpaper: off-white, usually textured, chalky-feeling.

- Asbestos-cement shingles used to re-side older framed houses from the 1930s through the 1970s: any color, cracked and chipped along the edges in high-traffic areas. Asbestos-cement roof shingles used from the 1940s through the 1960s: usually gray, often with brownish-white streaks in areas where water stands, very hard (pebbles tossed against them make a pinging sound).

- Asbestos-cement board: usually gray, 1/4-3/4" thick, brittle, easily broken, often found on joists above a furnace or boiler, around and beneath wood stoves, behind ceramic tile in a bathroom.

o Radon. Radon is a colorless, odorless, radioactive gas that occurs when uranium, a natural element, breaks down. Public Health Service studies have shown a link between some types of cancer and long-term exposure to radon gas. Buildings in areas where the earth contains large uranium deposits are more likely to have radon contamination. Since radon rises through the soil, it is most often found in basements, but it can be distributed throughout a building by the ventilation system. Old houses actually are somewhat less likely than newer ones to have radon contamination above the basement level because they have more cracks and better natural ventilation. Detection kits containing charcoal filters can be used to test for

the presence of radon, but they must be analyzed by a qualified laboratory. Corrective measures for radon include sealing cracks in foundation walls and insulating basement areas to keep the gas from rising to the upper floors.

- Lead Paint and Chemical Paint Removers. Almost all structures built before 1940 contain lead paint, whose removal may create health hazards. If the paint is not peeling and remains tight to the surface, it is not a threat. However, paint particles loosened by scraping or sanding can be inhaled, swallowed, or absorbed through the skin to cause lead poisoning and permanent damage to the central nervous system. Chemical removers are considered the safest way to remove lead paint. However, the chemicals themselves release toxic fumes that can cause permanent lung damage with long-term exposure. Most paint-removing solvents contain hazardous chemicals such as benzene, acetone, and methylene chloride. Many solvents are flammable, and their vapor may cause fire hazards in poorly ventilated spaces.

- Blowtorches. There may be a temptation to try to hurry the process of paint removal by using blowtorches. Blowtorches should never be used on historic structures. The high heat produced by an open flame releases vapors that may contain lead. Blowtorches also pose a serious threat of fire, even when they do not cause visible surface scorching. They can superheat the air inside columns , siding, cornices, and other hollow building elements, igniting debris, such as leaves, birds' nests, and even dust, causing fires to break out long after workmen have left the scene. Electric hot-air blowers and heat plates are considered safer for paint removal because they operate at a temperature that is lower than that required to vaporize lead or cause fires. After removal. lead paint residue is hazardous waste that must be disposed of under the hazardous waste disposal program. Treated surfaces should be damp mopped after cleaning to reduce dust that might contain lead. Most vacuum cleaner filters are too coarse to trap the tiny particles that are a hazard.

- Bird and Bat Deposits (Guano). Many old buildings contain large amounts of bird or bat droppings in attic or roof areas. These deposits can cause a number of infectious and potentially fatal diseases of the lungs and central nervous system. Removing the deposits requires special procedures in order to decontaminate the area without risking infection. When entering such areas, wear breathing masks and protective clothing. A sample of the material should be tested before work begins in order to determine what level of risk exists and decide what precautions should be taken.

- o Other Hazards.

  Carbon monoxide gas produced by inefficient heating systems.

  Indoor air quality adversely affected by the presence of various pollutants released from building materials, pesticides, or other chemicals used in and around the facility. Some foam insulations and particle boards contain formaldehyde, a chemical preservative that slowly evaporates out of the material and enters the building air supply. Likewise, some fertilizers and pesticides used around the exterior of the building foundation may infiltrate the building and enter the air supply. There are detection kits that can be used to test indoor air for the presence of various pollutants. However, most indoor air pollution problems can be remedied by an efficient mechanical ventilation system that has exterior air intake vents located away from pollutant sources.

  Structural hazards, such as joists and beams damaged by termites or by careless plumbers and electricians.

  Outdated wiring and electrical systems (e.g., knob-and-tube) , or plumbing systems with lead or lead-soldered pipes.

For Further Information:

Robert H. Sawyer, M.D., and Roger G. Morse, AIA, "An Inventory Process for Determining Asbestos Control Needs and costs," Architecture, December 1986, pp. 116-119. (Published by The American Institute of Architects, Washington, D.C.)

"Danger: Restoration may be Hazardous to your Health," The Old-House Journal, May 1976, pp. 9-11.

Jack Reilly, "Living With(out) Asbestos," The Old-House Journal, March/April 1987.

3.4.3 Architectural Barriers. About 10 percent of the population of the United States suffer from temporary or permanent physical handicaps. Yet, until recently, few buildings were designed for people in wheelchairs or on crutches or for the visually impaired. However, the Americans with Disabilities Act, PL 101-336 (effective July 26, 1992) will require employers to make "reasonable accommodations" to facilitate people with disabilities, including employees, visitors, and others. The law states that architectural barriers should be removed when the removal is "readily achievable." See also Uniform Federal Accessibility Standards (FED STD 795).

To some extent, the significance and use of a historic structure or site determines the kinds of access that can be provided. The objective is to provide independent access for all visitors and users of the historic 'resource, while interfering as little as possible with its historic and architectural character. If the physical changes needed to create that kind of access are destructive to the resource, alternatives may be considered, such as providing special aids or staff assistance or, in the case of museums, special interpretive or informational programs. (See Figure 3-3.)

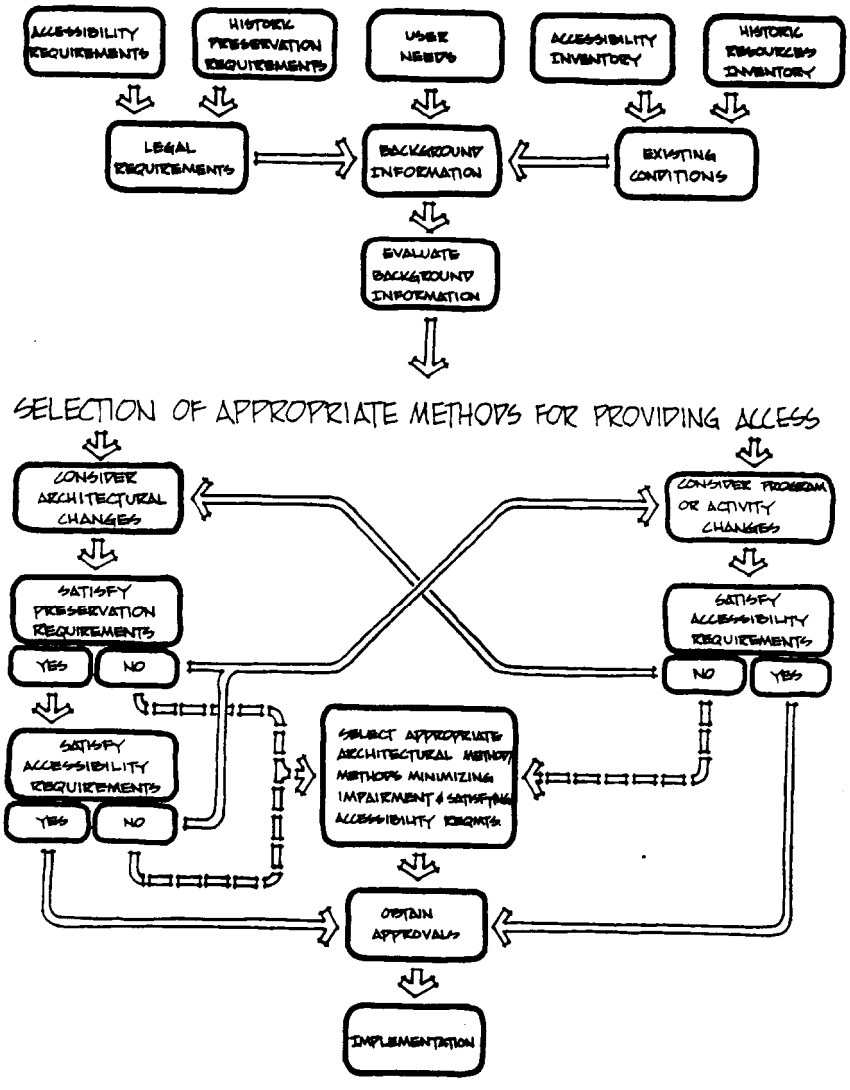


Figure 3-3. The Planning Process for Handicapped Access to Historic Buildings.

(Source: Robert P. Beden in Access to Historic Buildings for the Disabled, U.S. Department of the Interior)

Wheelchair Access. Wheelchairs for the physically handicapped usually create the greatest accessibility problems for historic structures. Large buildings often have main entrances with elegant doorways that are approached by monumental stairways. Even modest houses are usually reached by several steps. Often, these stairs are steep, and doorways are narrow and cannot be adapted for wheelchair traffic without harming the architectural character of the building. Inside the building, hallways and interior doors may be too narrow. There may be no elevators, and floor surfaces may be too rough to allow wheelchairs to move easily. Portable, temporary ramps might solve the problem, or other, more accessible entrances to the building might be used instead.

Toilet Facilities. Modern, fully usable and accessible toilet facilities, drinking fountains, and telephones should be provided for every person using the building. Sometimes these requirements can be met with just one private, fully equipped lavatory for use by both women and men.

Other Impairments. Other categories of disability include partial mobility impairment, such as the use of braces or crutches; inability to climb stairs or steep paths; and partial or total blindness or deafness.

For Further Information:

U. S. Department of the Interior, National Park Service. Accommodation of Disabled Visitors at Historic Sites in the National Park System. Washington, DC: U.S. Government Printing Office, 1983.

Stephen A. Kliment. Into the Mainstream, A Syllabus for a Barrier-Free Environment. Washington, D.C.: The Rehabilitation Services Administration, HEW, and the American Institute of Architects, 1975.

3.5 EMERGENCY PRESERVATION AND MOTHBALLING. Like ships, buildings sometimes have to be mothballed; that is placed in reserve for future use. Or they may suffer damage or potential damage that cannot be fully handled immediately, perhaps as a result of a hurricane, a fire, or an unexpected structural failure. These situations call for temporary measures to secure the building until permanent arrangements for repair or rehabilitation can be made. Since these “temporary" measures may have to last for years but may have to be done very quickly, they must be carefully planned in advance so that they can be carried out efficiently without causing further harm to the building.

3.5.1 Mothballing Maintenance Considerations. Check NAVFAC MO-300, Inactivation. Caretaker Maintenance, Closure and Reactivation of Shore Facilities, for mothballing steps. A few critical items are:

- o Stabilize the structure. First, deal with any damage that cannot wait. Shore up walls, stairways, and roofs that might collapse.

- o Waterproof the structure. Water is a building's mortal enemy. An empty building is especially at risk. Put the building under a secure roof. Make sure gutters and downspouts are sound and clear. Check flashing and install chimney caps if needed. Check basement drains often. Turn off the utilities (water, electricity, gas). Drain toilets and water pipes.

- o Close windows, doors, and other openings to keep out rain and snow. If necessary, sheets of plywood may be carefully inserted into openings. (Use screws, not nails, to minimize damage to original building materials.)

- o Keep vermin out. Birds, bats, rats, mice, groundhogs, squirrels, and skunks are destructive.

- o Provide thorough ventilation of attic and basement spaces. Louvered vents can be installed in existing window openings to keep air flowing through the building.

- o Keep an eye on the building. Regular inspection can spot trouble before it gets out of hand. Install fire or smoke detectors connected at least to an outside howler alarm or, preferably, to the base fire station. An intrusion alarm system is also desirable, even if it only catches a trespassing groundhog.

3.5.2 Emergency Preservation. The requirements for emergency preservation (the roof blows off, a wall collapses, a fire starts in the attic, or the first floor floods , etc.) are similar to those for mothballing. The main difference is that they have to be done fast to avoid further damage.

- o Waterproof. If necessary, add a temporary covering immediately to protect the interior until the roof is rebuilt, even if it must be a temporary covering of plastic. Follow the other waterproofing steps under the Mothballing section of NAVFAC MO-300, such as closing door and window openings. If there is water damage, be especially careful to allow for good air circulation.

- o Turn off the utilities. A gas leak, an electrical short, or a broken water pipe will make a bad situation worse!

- o Stabilize. Do whatever needs to be done to protect human life and to keep the damage from escalating. Shore up damaged walls, floors, stairs, and chimneys as needed. Look for evidence of structural damage still waiting to happen.

- o Secure any significant decorative features. If feasible, cover them in place, perhaps by boxing them in with plywood ., Otherwise, carefully remove and store them in a safe place. Photograph the features before removing or covering them, to aid in rehabilitation planning. Features to be protected include staircases, mantelpieces, ceiling cornices, door and window trim, and baseboards.

3.6 USE OF MAINTENANCE MANUALS, GUIDE SPECIFICATIONS AND OTHER PUBLICATIONS FOR HISTORIC FACILITY MAINTENANCE PLANNING. There are many books, magazines, guide specifications, brochures, and videotapes on methods and materials for treating historic facilities. However, the diversity of old materials and old techniques that can be encountered makes it likely that just the right guide specification does not exist. Maintenance manuals and Engineered Performance Standards (EPS) will provide basic guidance; however, the entire project should be evaluated with the sensitivity talked about throughout this manual. Public Works Departments are encouraged to compile specific data that directly addresses the local historic resources. The greater the library of alternatives, the higher the chance that the work performed will be sensitive to the historic values being preserved.

Planning for historic work should include those materials and methods that will, within the realm of economics, last the longest. This may include using new materials or technologies as they become available as long as they maintain the desired, or required, appearance of the building. Plan enough time so that proper attention can be given to those older materials, remembering that older materials do not always need to be replaced. Painting or providing simple weather protection can go a long way towards being most of the required preservation undertaking.

Again, remember to include enough time for the formal reviews required for projects that affect National Register listed and eligible properties. Be sure to contact the EFD, NAVFAC, and SHPO before work begins. They will have helpful planning techniques or resources to ensure the proper preservation actions are accomplished in accordance with the mandated policies. Early involvement by these organizations can help to prevent later delays in completing the project.

CHAPTER 4. HISTORIC BUILDING MAINTENANCE

4.1 POLICY AND OBJECTIVES. The National Historic Preservation Act of 1966 established a federal policy of stewardship for America's cultural resources, including its historic buildings. The act requires Federal agencies to identify the historic buildings they own, to use them wisely, and to maintain them for the benefit of future generations. The Navy is committed to preserving and maintaining its historic buildings, but not to restoring the buildings to an original or historic appearance. The National Park Service, as the lead preservation agency of the federal government, has developed guidelines for the preservation, stabilization and rehabilitation of historic buildings, based on standards established by the Secretary of the Interior.

4.1.1 Integrity of the Building: Original, Old, and Modern Aspects. Not every old building is historic, and not every historic building is very old. Some important historic structures are neither beautiful nor especially interesting to look at. Others have been altered or allowed to deteriorate so that they no longer qualify as historic. Certain parts of any historic structure are more important than other parts.

Even experts may have trouble sorting it all out, so it is not safe to rely on your own eye or personal taste. Check the construction date listed on the facility inventory. A construction date before 1946 should alert you that the building may require special historic treatment. Remember that, in historic buildings, protecting the building materials is a vital part of protecting the building. For this reason, even routine maintenance tasks need to be done with care.

Historic buildings lose their historic or architectural qualities if too much of what makes them significant is changed, lost, or removed. Additions that are more than fifty years old may also be historically significant.

Few historic buildings can or should remain completely unaltered indefinitely. For many good reasons, it may be desirable to add modern aspects to an old building: new rooms or entire building wings, interior partitions, handicapped-access aids, emergency exits, or modern amenities such as more efficient heating and air-conditioning systems, updated lighting and electrical service, even elevators. Such changes can help to , keep a building young if they are made in ways that respect the character of the building and its materials. If they are carelessly done, they can destroy its historic meaning and even the structure itself. Alterations and additions should be installed in a way that does not harm the historic fabric and can

be removed at a later date without leaving an impaired historic structure.

4.2 DETERIORATION OF MATERIALS. Even well-maintained buildings are constantly in the process of changing as the materials they are made of deteriorate. To understand why building materials fail and how they can be made to last longer, it is necessary to know something about their makeup. The following is a brief summary of the major building materials and some of their most frequent problems.

4.2.1 Masonry. Masonry is a term that applies to stone, brick, terra cotta, adobe, concrete, stucco, and mortar. It is one of the most durable of all building materials. A well-built and well-cared for masonry building can last for centuries, but it can be quickly ruined by the wrong maintenance or repair techniques or harsh cleaning methods, such as sandblasting.

- Brick. Brick is a mixture of clay and sand that has been shaped in molds, partially dried, and then baked at high temperatures to produce a hard surface. Generally, the older the brick, the softer and less dense it is and the more irregular the color and surface texture are. Hand-molded brick, used in buildings constructed before about 1830, is very soft. Pressed brick, used later in the 19th century, was mechanically formed under high pressure to make a hard, dense product with a smooth, uniform surface. Around the turn of the 20th century, pattern bricks in a variety of surface textures and in colors other than red or brown (usually yellow and cream) came into use. Especially in the earliest periods, bricks were often rubbed or shaped to achieve a decorative effect. Variations in color and texture produced by different natural materials in the clay and varied firing temperatures also produced decorative effects. Very soft, low-grade brick (salmon brick) may be found as filler behind face brick in buildings of all periods. This filler brick is especially subject to crumbling when exposed to water. The quality of brick, its size, color, and texture, and the various brick bonding patterns found in historic buildings often suggest when they were built and how they were used. (See Figure 4-l.) Brick surfaces may span or crumble, or the brick may crack. Harsh cleaning may remove the "crust" that is essential to the weathering ability of the brick. Repairing damaged brick is almost never feasible. A major advantage of masonry construction in general, and of brick buildings in particular, is that when building units decay or are damaged, they can be easily cut out and replaced. Sometimes bricks from a less visible part of the building can be swapped for damaged ones, or matching salvaged bricks can be found. Since bricks of almost every type are still being made, there is no reason to settle for less than an exact replica when replacements are needed.

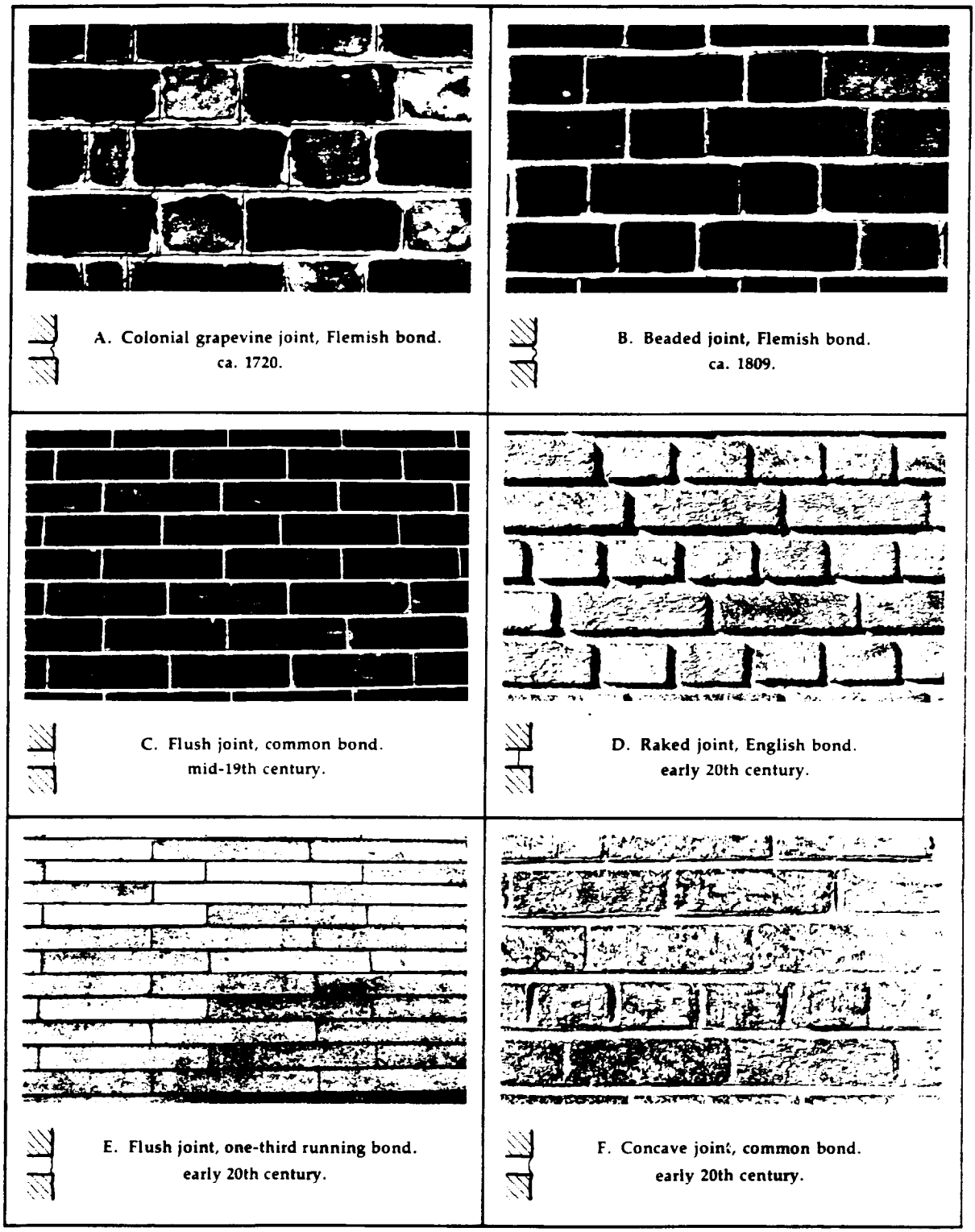


Figure 4-1. Brick Bonds in Historic Buildings.

(Illustration: Robert C. Mack, A.I.A. Preservation Briefs 2: Repointing Mortar Joints in Historic Brick Buildings, Technical Preservation Services Division, National Park Service)

- **Stone.** Although we think of stone as a hard material, many building stones are quite soft. For instance, limestone, sandstone (especially the type known as brownstone), and marble can be dissolved by plain water. They are all subject to pitting, staining, and erosion. The sulfuric acid in acid rain can dissolve the surface of limestone buildings. Structural stress can cause cracking, or moisture from the freeze-thaw cycle may cause spalling. The hard, protective crust on stone formed when it was new can be destroyed by harsh cleaning methods.

  Stone has a natural bedding plane, or direction in which its layers were formed in the earth, somewhat like the grain in wood. Often its structural strength as well as its beauty depends partly on its being laid with this plane perpendicular, rather than parallel, to the face of the building. Otherwise, it can delaminate, or separate along the bedding planes, and exfoliate (the face of the stone peels off). (See Figure 4-2.) Deicing chemicals can destroy masonry steps and walks and can leach into nearby masonry walls, causing chemical damage. Unlike brick, damaged stone often can be repaired using modern epoxies and consolidants. However, any repair more extensive than reattaching a small section must be done by masonry experts. (See Figures 4-3 and 4-4.)

- **Mortar.** Mortar is the bedding material that separates the building units in a masonry structure. The mortar used in most 18th and 19th century buildings was made of lime and sand, or of lime, sand, and a little cement, mixed with water. (See Figure 4-5.) Because it is elastic and soft in comparison with the masonry, mortar allows the structure to shift and "give" slightly under stress; it also cushions the individual masonry units from too much pressure. Early mortar, made mostly of lime, is very weak and porous compared to modern cement. However, its weakness is an advantage from the standpoint of old masonry, which would be overstressed if a hard mortar like portland cement was used. The absorbent quality of lime mortar can also be helpful, because it allows excess moisture to transpire, or "breathe" out of the building. On the other hand, its absorbency becomes troublesome when ground water is pulled up into the walls through capillary action, creating a condition known as "rising damp."

  Mortar mixes containing a high ratio of portland cement, an extremely hard mortar developed in the late 19th century, should be used only with compatible hard modern masonry. Do not use mortars high in portland cement on historic buildings. When soft brick is repointed with a hard cement, building stresses are transferred to the brick rather than to the mortar. Furthermore, excess moisture attempting to leave the building gets trapped within the brick rather than escaping through the mortar joints. Eventually, pressure

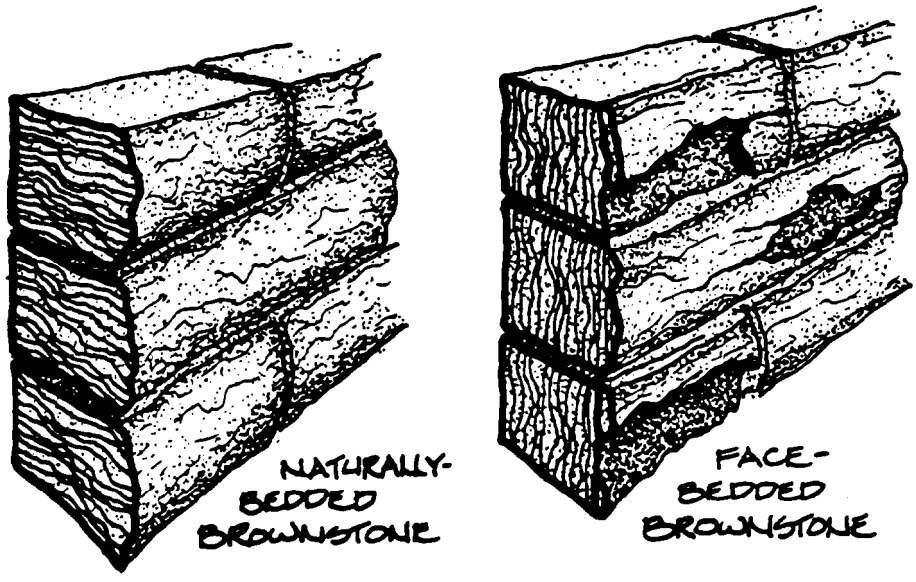


Figure 4-2. Stone Bedding Planes.

(Illustration: The Old-House Journal)

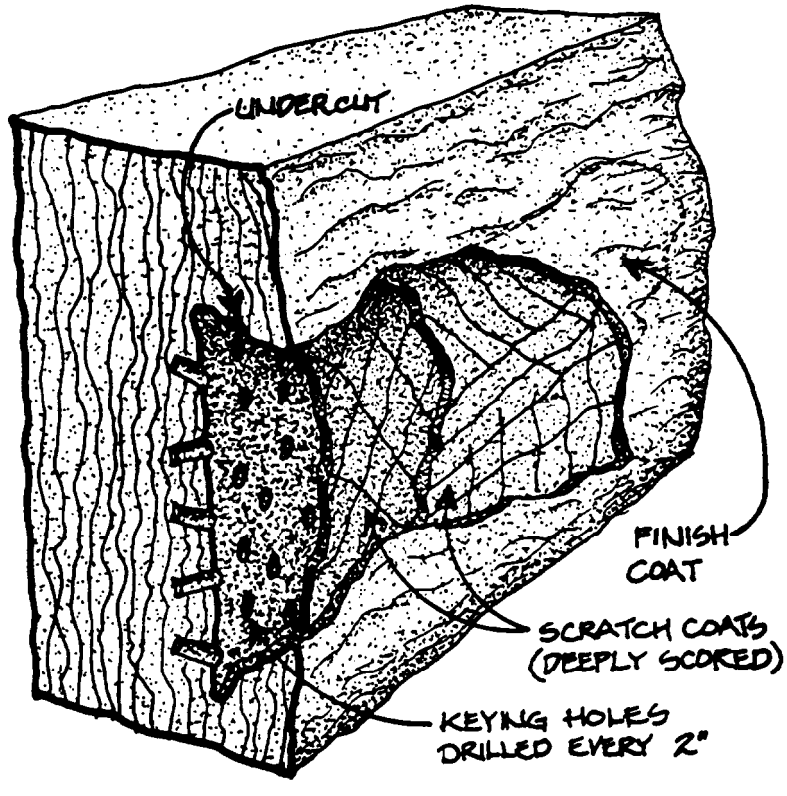


Figure 4-3. Patching Brownstone with Powdered Brownstone and Cement Mix.

(Illustration: The Old-House Journal)

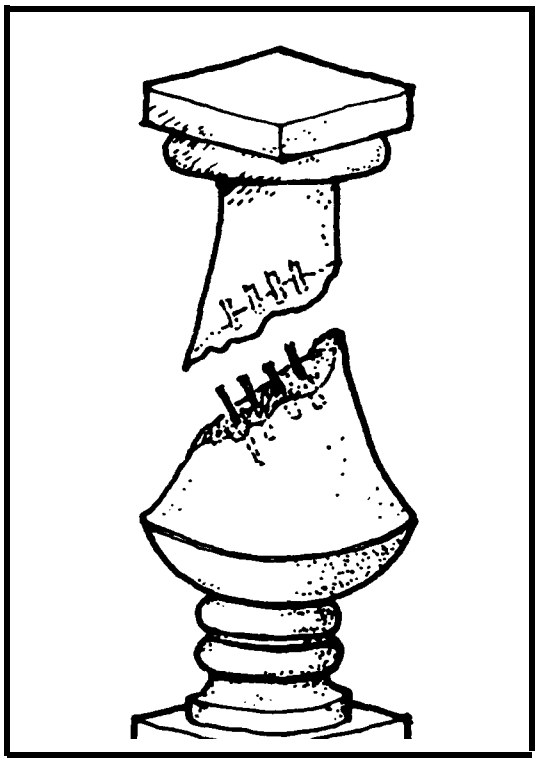


Figure 4-4. Blind Reattachment of Broken Stone.

(Source: Dinu Bumbaru, Heritage Montreal Foundation)

from the captured water and crystallized salts pops the face off the brick, creating an effect known as spalling. Many old repainting jobs used portland cement, which may now be impossible to remove without causing further damage to the bricks around it.

In general, repainting should be avoided unless it is clearly needed. Even when carefully done, it can damage old masonry. When repainting is necessary, the damaged mortar should be carefully raked out to a depth of about 1 inch, using only hand-held tools, such as chisels that are fitted to the joint. If the mortar is very powdery, an air jet or a gentle stream of water may be used to clean it out. Power tools such as cutting wheels or pneumatic chisels, should not be used on historic masonry, as it is impossible to avoid damage to the historic fabric.

Replacement mortar should match the old as closely as possible in composition and color. (Be sure to match the original mortar, not a later repainting job.) Use hydrated lime and clean sand that matches the original as closely as possible in color, type, and coarseness. To see what kind of sand is needed, crush a sample of the original mortar in water and let the sand settle out

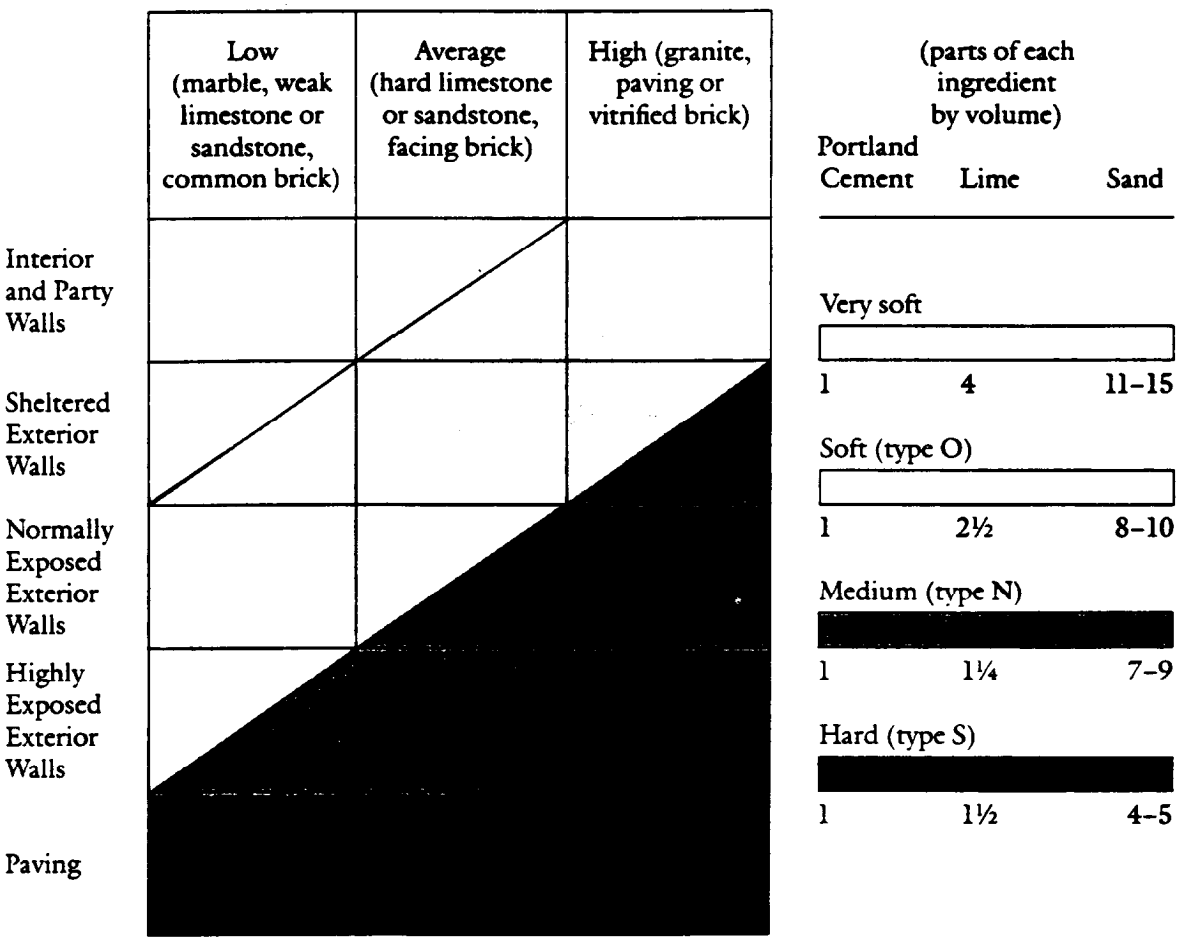


Figure 4-5. Guide to Mortar Mixes (Relative Mortar Strength) .

(Source: Dinu Bumbaru, Heritage Montreal Foundation)

It may be hard to get a perfect color match. Although mortar color is determined mostly by the color of the sand it contains, it is also affected by other factors, such as colored additives and weathering. To determine the original mortar color, carefully clean (by washing or gentle scraping) and examine joints in several different locations on the building. Unless you are matching a gray-to-black mortar, always use white cement, not gray. Color additives or manufactured tinted cements may be used, but it is sometimes better to give time and weathering a chance to soften the contrast between old and newly pointed areas than to add color. You may find that the historic mortar contains additives such as salt or sugar, but these are harmful and should never be added to replacement mortar.

New mortar joints should be of the same size and shape (profile) as the original. Since historic methods of pointing were quite different from modern ones, duplicating them requires special skills and tools. For large jobs, a skilled mason will be needed, and even an experienced worker may need practice to match a particular tooling effect. Be certain not to smear the new mortar over the brick edges. Mortar should never be smeared across the face of the stone except in rare cases when repainting an original rubble finish. (See Figures 4-6, 4-7, and 4-8.)

- Terra Cotta. Modern terra cotta is a hard, ceramic product that was developed in the late 19th century. It was often used as wall cladding or as a substitute for carved stone exterior decoration through the 1930s. It may be found also as tile decorations on buildings constructed in the 1920s and 1930s. Terra cotta comes in a wide range of finishes, from matte to gloss; the colors range from earth or stone hues to brilliant tones. Most damage to terra cotta is caused by using the wrong cleaning methods. Do not attempt to clean terra cotta with hydrofluoric acid or any other strong acid. Cracking or chipping of pieces is often caused by deteriorating anchoring systems. New terra cotta is available made to order to replace failed historic units.

- stucco . stucco , a waterproof type of exterior plaster, is made of lime, cement, and aggregate. It was originally intended to protect soft brick or wood construction and to provide a decorative surface. In historic buildings of the 18th and 19th centuries, it was often scored to resemble stone. Like interior plaster, it is usually laid on in three coats, the first a rough "brown" coat, the last a relatively smooth finish. In 20th century buildings, it frequently has a rough, aggregate finish, used both functionally and decoratively. Stucco made with a high portland cement content should not be used to repair most historic buildings.

- Concrete. A mixture of cement and aggregate, concrete came into general use in the late 19th century. It is a dense, very strong, relatively impermeable material that does not absorb water readily. Early concrete building blocks (similar to today's CMUs, or cement masonry units) were often molded to resemble stone. Poured concrete has been around since the 19th century, and became widely used when steel reinforcement became possible. Although concrete does not absorb moisture easily, the metal anchors or pins that hold it can get wet, rust, and expand enough to damage the concrete, causing it to span, exposing the reinforcing. Imitation stone made of cement and crushed stone aggregate has been frequently used in the 20th century.

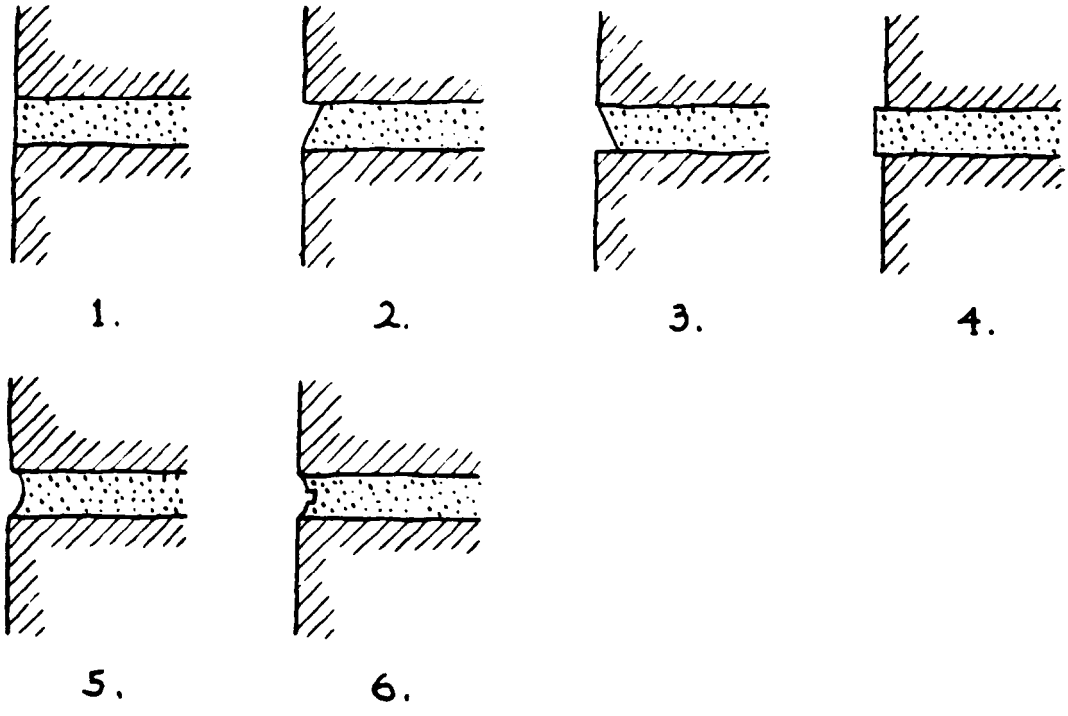


Figure 4-6. Brick Joints.

(Source: Harley J. McKee, Introduction to Early American Masonry, Copyright 1973, National Trust for Historic Preservation)

1. **Flush. Surplus mortar scraped off with a trowel.**
2. **Struck, with drip. Done with the point of a trowel.**
3. **Struck, without drip. Not for exterior exposure.**
4. **Raised.**
5. **Tooled. Done with a jointer.**
6. **Tooled and scribed (or ruled).**

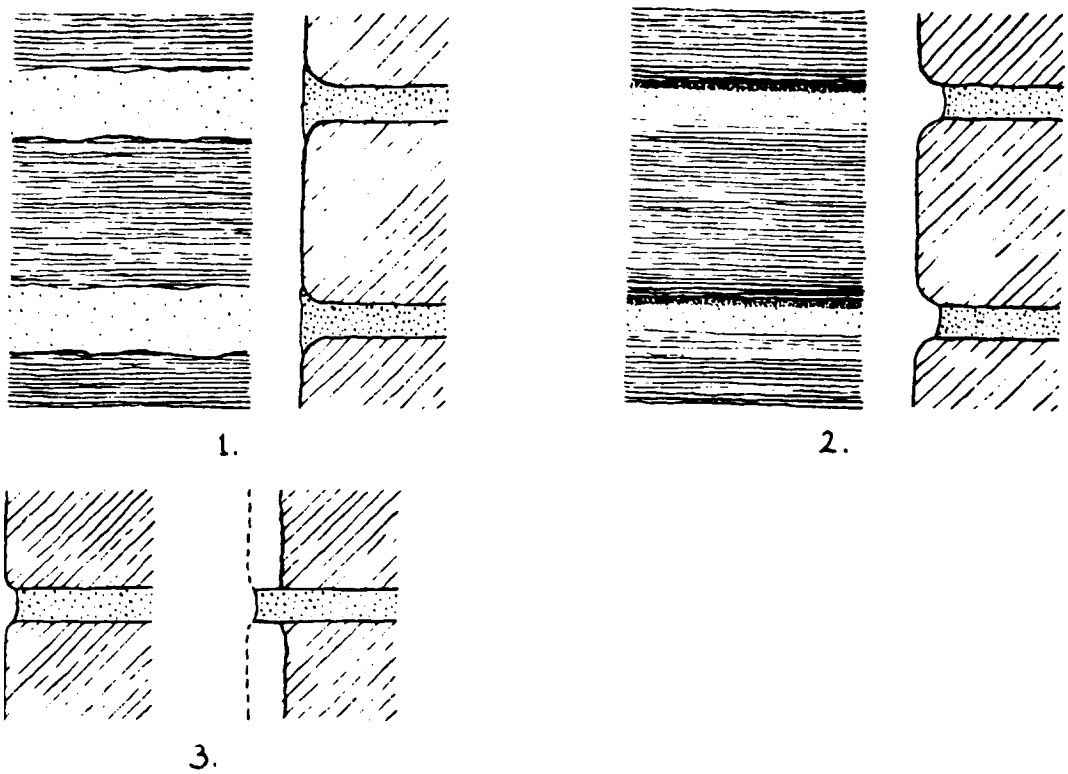


Figure 4-7. Repainting.

(Source: Harley J. McKee, Introduction to Early American Masonry, Copyright 1973, National Trust for Historic Preservation)

1. Old weathered brick or stone often has worn, rounded edges. Feather edges of mortar break off, taking with them particles of brick.
2. Recessed joints look better and are less susceptible to damage.
3. When soft bricks are pointed with hard cement mortar, the hard mortar remains but the bricks disintegrate.

CAUSES OF MASONRY DECAY

Major Causes of Masonry Decay. A certain amount of water is natural and necessary in all bricks and stones. However, when the moisture content is too high, soluble salts within the masonry may crystallize and cause damage. Where do the salts come from? Often they are brought up from the soil by rising damp, which is caused by water being wicked up into the masonry from wet ground and foundations. The damage caused by rising damp may reach one to two feet above the ground. In much the same way, chemicals used to melt snow from walks and drives near a building can leach into the walls and crystallize. In cold climates, excessive moisture within the masonry alternately freezes (expands) and thaws (contracts), with similar harmful results. Under flood

HOW TO REPOINT

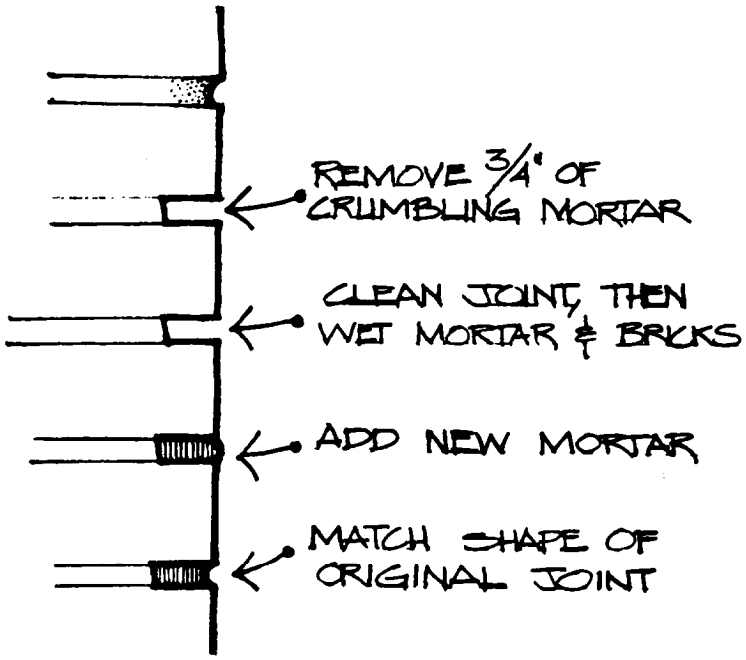


Figure 4-8. How to Repoint.

(Illustration: Blair Prentice, Rehab RiGht; How to Realize the Full Value of Your Old House, Copyright 1978 & 1986, City of Oakland, CA)

conditions, when water flows through masonry walls, different parts of the building may settle at different rates, causing uneven stress on the building parts. Flooding can also damage other building materials, causing, for example, wood to rot or iron masonry anchors to rust. Inappropriate rehabilitation techniques such as sandblasting or repainting with hard mortar can also create severe problems. Another cause of masonry deterioration is differential expansion, which takes place when one part of the building reacts to changes in temperature more quickly than other parts do, or when a building shifts because of weaknesses in the soil, foundations, or structure. Damage from mechanical impact may be caused by accidents (as when a truck backs into the corner of a brick building), by wear or tear from normal use (like heavy foot traffic on limestone steps), or by inappropriate renovation techniques such as the use of power tools to cut out old mortar joints. Chemical disintegration may result from pollutants in the atmosphere (such as the sulfuric acid in acid rain, which turns limestone into gypsum that washes away) or from acids secreted by moss or lichens.

SUMMARY OF MAINTENANCE AND REPAIR PROCEDURES FOR MASONRY STRUCTURES

RECOMMENDED :	NOT RECOMMENDED:
Retain original masonry and mortar whenever possible without applying any surface treatment.	Do not apply waterproof or water repellent coatings or other treatments unless required to solve a specific problem that has been studied and identified. Coatings are frequently unnecessary and expensive. Waterproof coatings may prevent the natural transfer of water vapor from the building, causing masonry to deteriorate.
Repoint only those mortar joints where there is evidence of moisture problems or when sufficient mortar is missing to allow water to stand in the mortar joint.	Do not repoint mortar joints that do not need repainting. Do not use electric saws or hammers to remove mortar.
Duplicate old mortar in composition, color, and texture. Duplicate old mortar in joint size, method of application, and joint profile. Repair stucco with a stucco mixture that duplicates the original as closely as possible in appearance and texture.	Do not repoint with mortar of high portland cement content, creating a bond that may be stronger than the building material. Do not repoint with mortar joints of a differing size, profile, texture, or color.
Clean masonry only when necessary to stabilize the brickwork by halting deterioration. Always use the gentlest method possible.	Do not sandblast brick or stone surfaces. Do not clean with high--pressure water. Do not use chemical products that could have an adverse chemical reaction with the masonry materials, e.g. acid cleaners on limestone or marble.

Retain the original or early color and texture of masonry surfaces wherever possible. Brick or stone surfaces may have been painted or whitewashed for practical or aesthetic reasons.

Do not use electric saws or hammers to remove mortar.

Do not remove paint from masonry surfaces unless it is necessary. This may subject the building to damage and may change its historical appearance.

Repair or replace where necessary, deteriorated material with new material that duplicates the old as closely as possible.

(Further discussion of masonry maintenance problems and recommended solutions may be found in Sections 4.3, Moisture Problems; 4.4, Cleaning and Coatings; 4.5, Structural Maintenance; 4.9, Exterior Wall Systems: and 4.17, New and Substitute Materials.)

4.2.2 Metal. Metals found in historic structures include wrought and cast iron, tin, lead, zinc, copper, bronze, brass, lead, steel, terne, nickel and nickel alloys, stainless steel, and aluminum. These metals are found as nails, hardware, roofs, decorative crestings, balusters, domes, cupolas, railings, interior and exterior stairways, window tames, window frames, masonry anchors, girders, trusses, paint, and walls--almost anything and everything a building might contain, from structure to decoration. In order to stop metal deterioration and repair damage, it is essential, but not always easy, to identify the metal. Most metal problems are caused by water, corrosion, or galvanic reactions.

- o Corrosion. Architectural metals most often deteriorate through corrosion (also called oxidation), the chemical reaction of a metal with oxygen or other substances. The corrosion attack may be uniform (the metal corrodes evenly wherever it is exposed to corrosive agents) or selective (certain parts are affected more than others because of a difference in composition of the parts). Corrosion can take many forms:

  - -Pitting.
  - -Stress corrosion cracking (caused when wrought, or worked metal reacts to chemicals in the environment) .
  - -Erosion (caused by abrasion that exposes fresh metal to corrosive agents) .
  - -Galvanic corrosion (an electrochemical reaction to contact between two different metals, such as an iron nail in a copper roof).

-Atmospheric corrosion (the most common form, caused by the sulfur compounds found in industrial exhausts and the salt air and seawater in coastal areas).

Not all corrosion is bad. Oxidation sometimes forms a protective coating for the metal, limiting further damage. The greenish patina that forms on copper roofs is one example of this "healthy" corrosion.

o Mechanical breakdown. Metals may break down because of abrasion from moving dirt, dust, sand, grit, sleet and hail, or rubbing. Abrasion is especially critical with metal flashings and valleys used on slate roofs. Human use is another cause of abrasion. Roof areas that must be walked on for maintenance should be protected with wood decking. Metal fatigue is caused by repeated low-level stress. Metal fatigue often causes the failure of copper roofs, which expand and contract in response to temperature changes. It also may lead to structural failures of metal railroad bridges. Creep, overloading, fire damage, weathering, and connection failure are other common metal problems. Cast iron may not only rust, but can also be split by freeze-thaw cycles if water gets behind the rust as in a column or baluster. When iron pieces are attached to masonry, such as stair railings set in stone or concrete, rusting iron may expand and split the masonry. Most architectural cast iron is made of many small pieces bolted together. Many problems, such as wobbly stair rails, can be solved by taking the element apart, and cleaning and tightening all the bolts. You may have to use a larger bolt or screw to make up for metal lost through rusting.

4.2.3 Wood. Fire may be the fastest way to destroy wood, but water is by far the most common. Besides the damage it can do directly, it encourages fungus, mold, and insects; and it hastens structural failure by weakening wood members. Dry rot, wet rot, brown rot, fungus, and mold are all signs of excessive moisture. Insect infestations require professional treatment. Be alert for evidence of bugs or damage. Powderpost beetles leave little piles of sawdust at their exit holes. Old-house borers make large oval holes in coniferous wood. Termite damage can be found by sticking a pen knife into the wood. Professional inspection and treatment for insect infestation is needed to prevent further damage. (See Figure 4-9.)

Decayed wood should be replaced or repaired whenever it is found. Epoxies can be used to stabilize damaged pieces. In-kind replacement (i.e., with wood) is usually fairly simple. Molded and decorative shapes are widely available from commercial shops. When necessary, large decorative features high on a building may

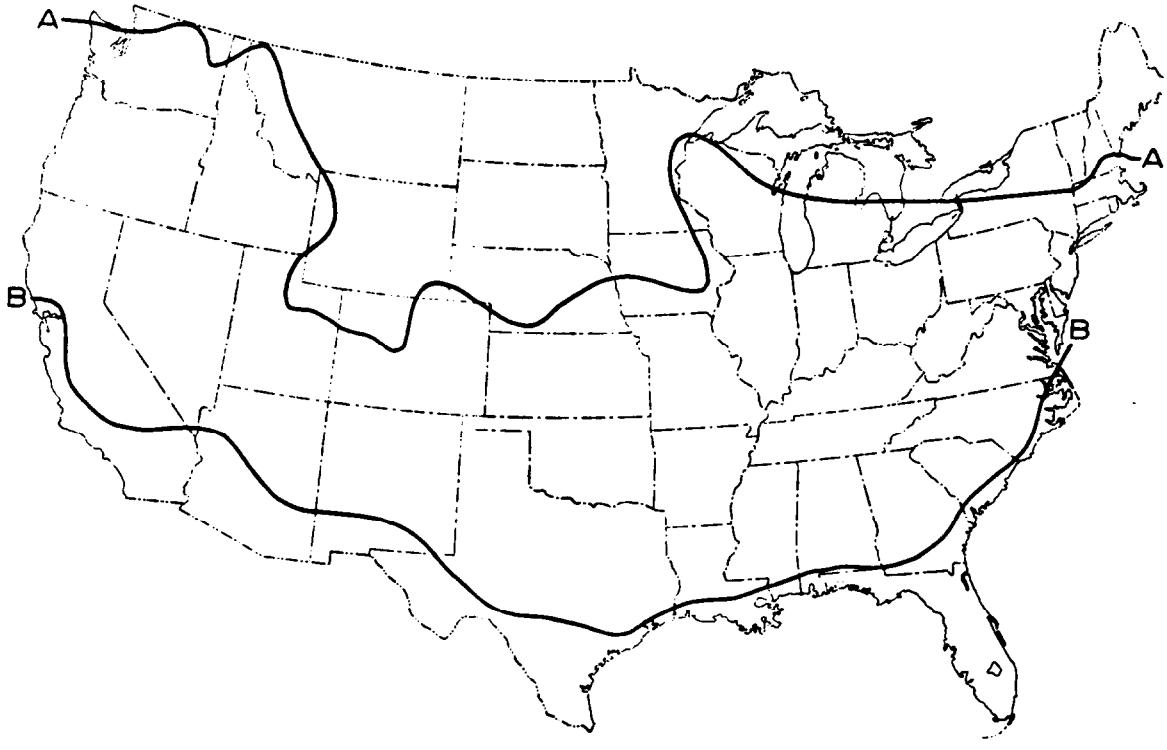


Figure 4-9. Northern Geographical Limits for Termite Damage. The northern limit of damage in the United States by subterranean termites (Line A) ; by dry-wood or non-subterranean termites (Line B).

(Source: U.S. Department of Agriculture)

be replaced with fiberglass or sheet metal fabrications made by a specialist. They should be considered only when the replacements are too high up on the building to be easily seen from the ground or when the original wooden pieces are too heavy to be safely supported by the historic structure.

In choosing replacement wood, keep in mind the shape and character of the original. Modern standard lumber sizes are smaller than historic lumber sizes. Replacement pieces should be cut to match the old pieces exactly, since even small differences will be very obvious on the finished job. If it is not to be painted, the new wood should match the old wood in species, grain, and color. Do not repaint unless you have to. Clean before repainting, but do not use water or chemicals on bare wood .

Keep the wood dry. Keep gutters, downspouts, and roof flashing in good repair. Do not let water stand on roofs, window sills, door and window lintel tops, cornices, or decorative elements. Allow ventilation. Keep weep holes open in hollow vertical elements such as columns. Provide them if needed. Weathering of bare wood may cause discoloration, erosion, and disintegration. Generally, bare wood should be treated with preservatives and\or primed and painted. Pentachlorophenol solutions (5% pentachlorophenol solution in water) should be applied to sanded wood before repainting. A 10% solution may be used for wood that is often wet. To waterproof butt joints, end joints, and other vertical joints, use a 20% solution in water with oil or liquid paraffin additives.

4.3 MOISTURE PROBLEMS. Protecting the building from excessive moisture is the most important goal of a historic building maintenance program. Moisture should be the prime suspect whenever almost anything goes wrong with an old building.

Water is the enemy of all building materials--wood, masonry, stone, or metal. It attacks from every direction--as snow or rain, as humidity, as free water in the soil or as rising damp within the walls. It collects on rooftops, in basements, and in insulation. Nearly every cause of building decay, including vegetation, fungus, insect infestation, chemical damage, and other ills, is made possible or made worse by the presence of moisture. (See Figure 4-10.)

Moisture meters can be used to detect and quantify excess moisture, but many early symptoms are easy to spot without special equipment. It is useless and sometimes impossible to repair water-related damage unless the cause of excessive moisture is eliminated. Simple, preventive maintenance is usually the best way to keep a building dry and sound.

IF YOU FIND THESE THINGS WHEN INSPECTING FOR MOISTURE:

Standing water

Peeling paint

Damp wallpaper and powdery plaster

Damaged floors

Rotting wood (dry rot)

Rusting metal

Deteriorated mortar

Molds and fungi

Efflorescence, spalling, or discolored masonry

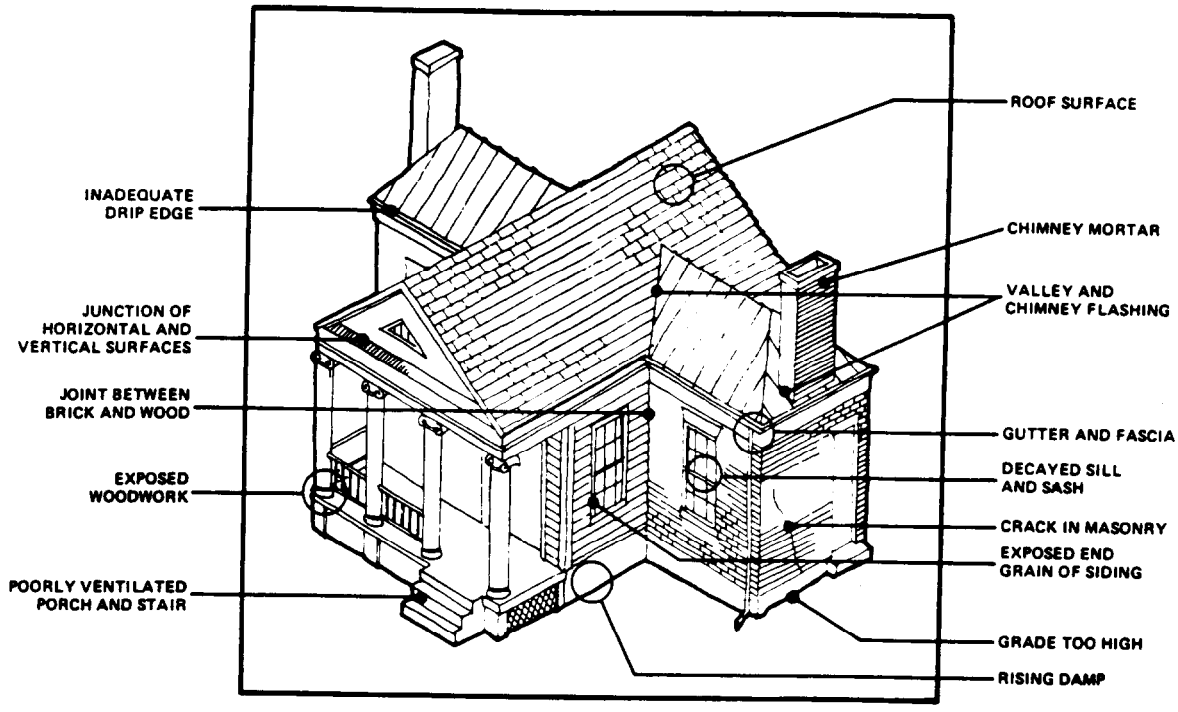


Figure 4-10. Potential Areas of Decay.

(Source: Douglas Bucher, Preservation League of New York State)

IF YOU FIND THESE THINGS WHEN INSPECTING FOR MOISTURE (Cont.):

- Insect infestation
- Damp, musty inside air...

THEN LOOK FOR:

- Faulty mortar
- Damaged parapets
- Cracks in the masonry
- Defective caulking, sealants, and expansion joints
- Defective gutters, downspouts, and flashing
- Leaky copings

THEN LOOK FOR (Cont.):

Rising damp

Ivy or other vegetation

Damaged surfaces (e.g., sandblasted brick, faulty wood siding) . . .

THEN DO THESE THINGS AS FIRST PRIORITY:

- **Maintain, clean, or repair roofs, flashing, gutters, downspouts, windows, caulking, mortar joints, weep holes in columns, etc.**
- **Keep attic, basement, and foundations dry and well ventilated, with properly working floor and ground drains as needed.**
- **Keep door and window frames tight-fitting and well caulked.**
- **Keep shrubbery and vines away from the walls and foundations. Do not overwater plants near the building foundation.**

CONSIDER THESE STEPS AS LAST RESORTS:

- **Damp-proof courses and French drains**
- **Below-grade waterproofing agents**
- **Above-grade water repellent coatings.**

(See Figures 4-11 and 4-12.)

4.4 CLEANING AND COATINGS.

4.4.1 Cleaning of Masonry. The usual reason for wanting to clean masonry buildings is cosmetic. Clean buildings often look nicer than dirty ones. Cleaning can also reveal historic features, colors, or textures that have been hidden under years of dirt. Cleaning masonry can make repairs easier and prevent further damage.

However, improper cleaning can have exactly the opposite effect, causing irreversible damage. Before beginning a masonry cleaning project, get the advice of an experienced and unbiased masonry specialist (not a cleaning contractor) . This is no time for home remedies and self-help because mistakes can be costly and permanent. The SHPO can recommend appropriate methods and sources of expert advice.

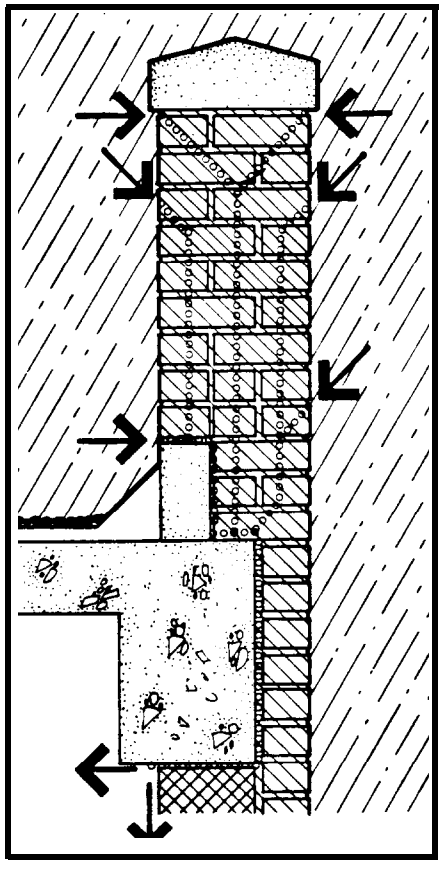


Figure 4-11. Sources of Water Damage Around Chimneys. Note entry points at chimney cap, parapet, flashing, and defective mortar joints.

(Source: Respectful Rehabilitation: Masonry, The Preservation Press, National Trust for Historic Preservation)

Before attempting any type of cleaning, it is important to find out what kinds of dirt are present, determine whether the dirt is actually damaging the building, and decide on the gentlest possible means of removing it. Dirty buildings usually have a combination of dirt, soot, smoke, bird droppings, oil stains, metal stains such as rust and copper, graffiti, paint, tar, and\or organic stains left by moss, algae, lichen, fungi, and ivy tendrils. The masonry itself may have developed a dirty-looking protective crust that cannot be removed without removing part of the masonry. One type of dirt found in urban and industrial areas is grime, a black or gray crust formed by the interaction of airborne particles from natural and industrial sources with microorganisms like fungi, algae, or ivy secretions, as well as byproducts from the breakdown of the masonry surface itself.

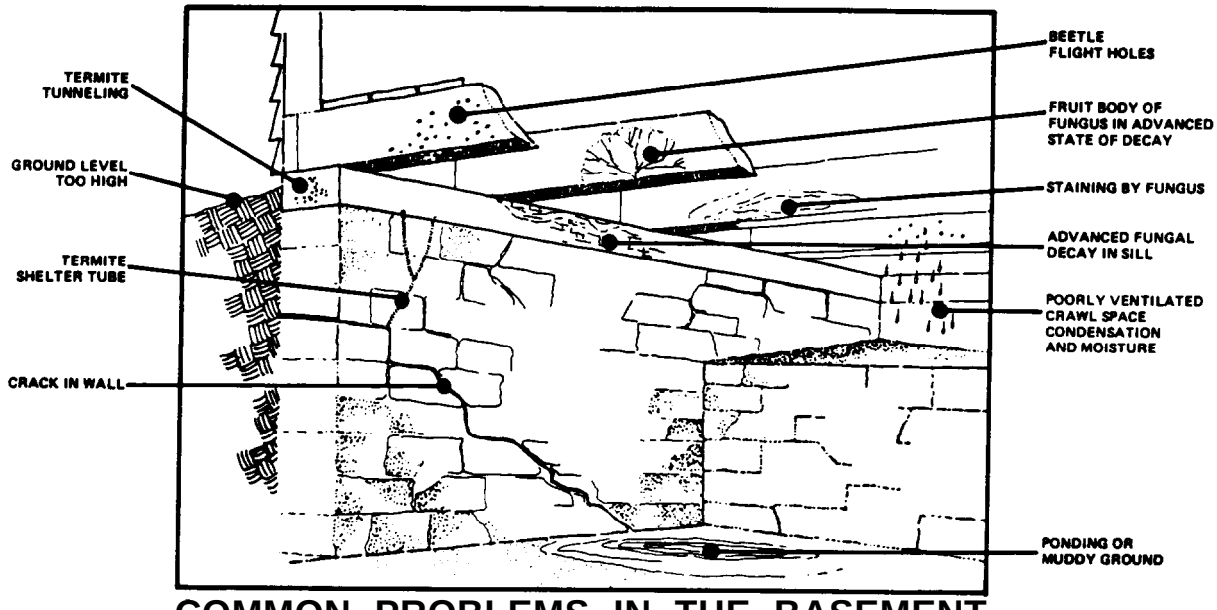


Figure 4-12. Common Problems in the Basement.

(Source: Douglas Bucher, Preservation League of New York State)

PRODUCTS FOR USE IN SPOT CLEANING STONEWORK

NOTE : Before undertaking cleaning, test in a small, inconspicuous area. Water must be clean and free of metallic elements.

Graffiti, spray paint	On exterior stonework: acetone, varnish solvent, commercial paint stripper. On interior stonework: solvents such as lacquer thinners or chlorinated hydrocarbons (most effective with fresh stains)
Asphalt, bitumen, tar	Kerosene, xylene, toluene, mineral spirits, chlorinated solvents, automobile asphalt cleaner.
Oil, grease	Chlorinated solvents, petroleum solvents, ammonium hydroxide.

Rust	Oxalic acid poultice (on granite), sodium citrate or ammonium citrate (on carbonate stones such as marble or limestone), citric acid.
Copper and alloys	Ammonium carbonate, ammonia solutions, sulfamic acid, ammonium chloride.
Lichen, moss, ivy, plants	Commercial herbicides, detergents, household bleach.
Algae, mushrooms, mold	Soap, commercial powdered cleanser with bleach (e.g., Ajax, Comet), calcium hypochlorite (chlorinated lime), leaching powders, peroxide.
Tobacco smoke, old coating residues	Bleaching poultices made with hydrogen peroxide or hypochlorite bleach (e.g., clorox). On marble: paste of calcium hypochlorite mixed with hydrated lime.

(Based on material in Respectful Rehabilitation: Masonry - How to Care for Old and Historic Brick and Stone, by Mark London. Washington: The Preservation Press, 1986.)

Take the time to get a clear idea of what the problem is and what can safely be done about it. Any cleaning methods being considered should be tried first on a test patch (about two square feet on brick or one entire unit on a stone wall) on an inconspicuous part of the building. Allow plenty of time for results to appear. Deterioration or discoloration may take months to show up.

Removing Graffiti. Historical graffiti (for instance, the names of early residents written on an attic wall) should be preserved. Modern graffiti (lipstick, spray paint, and magic-marker messages) should usually be removed. Solvents must be chosen to fit the particular stain and applied as a poultice (a paste made of a chemical mixed with an inert substance such as talc, fullers earth, chalk powder, clay, sawdust, whiting, or diatomaceous earth.) The poultice is spread 1/3 to 1/2 inch thick on the pre-wetted stained surface, covered with a plastic sheet, and allowed to dry slowly. When dry, it is carefully removed, then rinsed with water. (See Figure 4-13.) A poultice

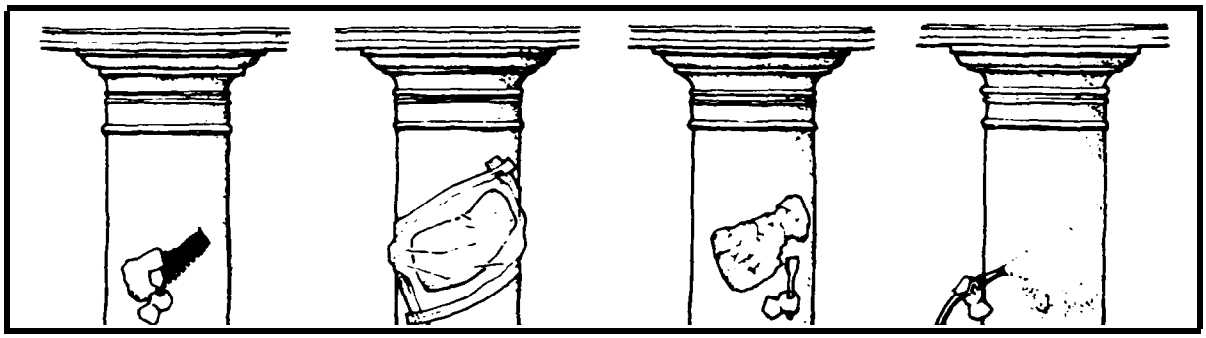


Figure 4-13. How to Apply a Poultice.

Absorbent material is applied to stain; the area is covered; poultice is scraped off with wooden spatula; the surface is rinsed with water.

(Source: Dinu Bumbaru, Heritage Montreal Foundation)

made of a paint remover containing methylene chloride-based paint remover mixed with talc, chalk, or clay as a thickening agent is effective against felt tip marker ink. Anti-graffiti surface coatings (e.g. , urethanes, acrylics, silicones) should be avoided because they frequently change the appearance of the coated surface and may even act as a primer for some markers.

Paint removal from masonry. Do not remove paint unnecessarily. Complete removal is usually a mistake, since the paint was very likely put there for a good reason--perhaps to protect soft or deteriorated brick or to hide sloppy original masonry work. It may have been part of the original decorative scheme for the building. Stripping it can damage the surface beneath or speed deterioration. As a general rule, paint should be taken down only to the first, tight, undamaged layer. In removing paint, keep in mind that any building constructed before 1950 may contain lead paint. Lead-based paint removed by any method is hazardous waste and must be disposed of accordingly. Use proper precautions.

Before starting a stripping job, carefully remove paint from several test patches in an unobtrusive section of the building to see what problems may arise. The sequence of paints and paint colors on a building is a part of its history. If all of the paint is to be removed, the research necessary to determine the original colors should be done before stripping. Keep as-is at least one small section that contains every paint color as historic evidence.

Badly peeling surfaces that will be repainted should be prepared by hand, using natural bristle or nylon brushes and hand scrapers to remove only the deteriorated paint. Trisodium phosphate (TSP) in water is a good cleaner if you are planning to repaint a basically sound surface, as it softens and removes the old top layer, leaving a deglossed surface.

Always use the gentlest cleaning method possible. Avoid abrasive cleaning. Abrasive cleaning methods, such as wet or dry sand or grit blasting, even at very low pressure, should never be used on historic masonry or wood buildings. These methods destroy the hard outer skin of bricks and terra cotta and even stone. Once this protection is gone, the surfaces become much more likely to soak up water, leading to problems such as spalling, exfoliation, efflorescence, and decay. Abrasive cleaning can also damage nearby building surfaces, such as glass. It is a hazard to workers, bystanders, and automobiles, as well as to shrubbery and other landscape features. If it is necessary to remove all the paint, the following methods may be considered:

- o Wet cleaning. It is usually safe to begin cleaning masonry with a low-pressure spray of plain water from a hand-held garden hose and a gentle scrub using a soft, natural bristle brush. Do not use wire brushes-- they are hard on the masonry, and particles of the wire may be left behind to rust and stain. A tablespoon or 2 of liquid nonionic detergent, such as household dishwashing liquid, can be added to each gallon of water. If that fails, prolonged spraying or misting with plain water at low pressure may soften surface dirt enough to allow it to be rinsed off. The spraying should be done intermittently for only 3 or 4 minutes at a time with a pause of several seconds in between. This will keep the surface from drying and also avoid penetrating masonry joints or damaging the surface. (Attach a timer to the hose.) The softening process may take up to a week. High-pressure washing (600 - 1800 psi) should not be used on any except the hardest surfaces, since softer stone (like limestone, sandstone, and marble) can be eroded by high pressure water. Steam cleaning is expensive, slow (average working time: 1 minute/square foot), and somewhat hazardous to the worker. It is useful for cleaning intricately carved areas without heavy brushing, and it is less likely to cause staining than prolonged washing.

  There are some problems associated with wet cleaning. Chemicals in the water may react adversely with those in the masonry. For instance, water containing copper or iron can cause stains on the surface of building stone. (Adding chelating chemicals to trap the metal in the wash water can help to prevent this effect.) Water may bring mineral salts in brick or stone to the surface, causing a hazy, white film called efflorescence. This discoloration is harmless in itself and can usually be brushed away without permanent damage to the masonry. Check the pH level of the water before starting. Prolonged washing with even slightly acidic water, such as that from most public water supplies, can dissolve limestone or marble surfaces. Masonry can be structurally weakened by saturation. Water that penetrates through mortar joints to interior surfaces can saturate insulation and damage

finishes and materials. Wet cleaning should not be carried out when there is any danger of frost within the next several weeks. (The U.S. Weather Bureau can provide average freeze dates for autumn and spring for any part of the country.) Watch for ground saturation caused by spraying. It can cause rising damp.

Before wet cleaning:

- Make sure that damaged masonry and joints have been repaired and that caulking and mortar are sound.
- Use techniques requiring the least amount of water.
- Use only plastic or nonferrous tools.
- Seal door and window openings with 15-millimeter polyethylene taped all around the opening.

- Heating Tools. Heat guns and heat plates that have a working temperature of less than 750°F may be used with caution. Propane torches and other types of open flame should never be used on any historic building. Many historic building fires have resulted from their use. In addition, they can damage old brick, wood, and other building materials, and break window glass. They also create hazardous fumes, as they vaporize any lead that may be present in the paint. Whenever heat is used to remove paint, a fire watch must be kept on the site for at least 3 hours after discontinuing the heat use. Smoldering fires can take a long time to show up.

- Chemicals. Paint-stripping chemicals should be used only when necessary and by professionals. Although chemicals are the most effective way to completely strip paint, they present environmental and health hazards. Chemical stripping is also slow and often messy. If several layers of different types of paint must be removed, it may be necessary to use a different chemical on each layer.

  Alkaline strippers (sodium or potassium hydroxide-based) work best on old linseed oil paints. One disadvantage of alkaline strippers is that they can cause efflorescence on masonry surfaces. A weak hydrofluoric acid cleanser is sometimes applied as a neutralizer before rinsing thoroughly with water.

  Organic chemicals such as methylene chloride are better for modern paints and finishes such as urethane varnishes or epoxy. Methylene chloride strippers must be applied as poultices, or leaching packs, to avoid spreading stains. They require thorough rinsing. Methylene chloride is a carcinogen and it should be used only out doors or in

well-ventilated areas. Safer strippers, made with dibasic acid esters and other chemicals, such as biodegradable citrus derivatives, are now available.

Blanket or mat-type strippers are similar to leach packs, but they have the advantage of containing the paint residue after it is removed so that disposal is simpler and safer.

Lime washes, such as whitewash, can be dissolved in acids.

- Mechanical Means. Careful hand sanding and scraping are often good ways of removing paint. Belt sanders, rotary wire brushes, and power-driven carbide cones and discs should not be used on historic buildings. Sanding and scraping, even by hand, can create dust containing toxic materials such as lead. They require the use of masks and careful cleanup.

4.4.2 Masonry Coatings and Paint. Waterproof or water-repellent coatings or other treatments should not be used unless necessary to solve a specific problem that has been studied and identified. The coatings are often expensive and unnecessary, and they do not stabilize masonry by preventing further deterioration.

Waterproof coatings seal the surface of masonry against both water and water vapor. They are intended for use below grade. Water-repellent coatings, which seal against water but not against water vapor, should be used above grade. Coatings can trap moisture within the masonry, causing spalling and other damage. Silicone sealers (the most commonly used type) may add a slight sheen to the finish. They must be renewed after 5 to 7 years. They may cause subflorescence (a build-up of mineral salts beneath the surface of the masonry) , which can lead to spalling. Only-water soluble solutions (such as silicones and siliconates) are acceptable for use on historic buildings. Do not use acrylic or polymeric solutions (acrilates) , polyvinyl chloride (PVC), or polyvinylacetate.

Paint is a traditional protective coating for brick. Although it is considered reversible because it can be removed, its removal can damage the original surface. In general, historic buildings should not be painted for purely cosmetic reasons. Built-up paint can obscure important decorative details and interfere with the masonry's ability to breathe. Often, cleaning is enough to renew the surface.

Paint can create many of the same problems as other coatings. Traditional whitewashes (lime washes) allow some vapor transmission, but there are modern latex paints made especially for exterior masonry walls that are preferred. Paints such as epoxies and some alkyds may not allow masonry or wood to breathe

and should not be used. Even latex paints, if applied in too many layers, can become impermeable.

4.5 STRUCTURAL MAINTENANCE. The first problem in addressing a structural problem is recognizing there is a problem. After many years of painting, patching, additions, and alterations, the structural problem often can go undetected.

Structural problems show up in the visual condition of materials. Examples are cracks in foundations, warped or bowed timber framing, and deteriorated materials. (See Figure 4-14.) Other indicators of structural damage can be sour odors or visual fungus, which may indicate dry or wet rot. Dust piles, metal shavings, or wood chip piles may indicate structural movement or insect damage. In general, historic buildings do not need to meet the same structural design requirements as contemporary buildings. Accept moderate deflections; measure and monitor crack dimensions and movement; and prudently assess the existing condition.

The predominant damage to foundations is caused by movement of piles or pile caps, rotting of wood piles, settlement, or a change in ground water level. Therefore, there is an associated change in the bearing capacity of the structure. The engineering principles needed to fix a problem are best left to structural engineers. A rule of thumb in dealing with foundation problems is not to reinforce isolated areas without considering the resultant forces on the rest of the structure.

For evaluating masonry damage, consider that mixtures of mortar in historic structures were predominantly lime mixtures, which are softer and less durable than those used in modern construction. Portland cement mortar under movement conditions will frequently split off brick and stone faces because it is stronger than the lime mortar. (As shown in Figure 4-14.) Consider using lime mortars for repainting masonry.

Timber construction by its nature will droop or sag over time. This by itself does not mean that the structure is not sound. The problems with timber construction are found most frequently when the wood is cut away to accommodate an alteration. A second area worth investigating is the possibility of bug infestation. If bugs are present and the timbers are hollow or decayed, fumigation and application of bug-toxic preservatives should be pursued. Fungus can deteriorate the structure if the environment is not heated or cooled to prevent the growth.

Wrought iron was the grandfather of steel by 100 years. The early items used were fasteners, hardware, and various compression members. Wrought iron was not frequently used as tension members because of its brittle nature. By the early 1900s, steel became a material of choice because of its ability

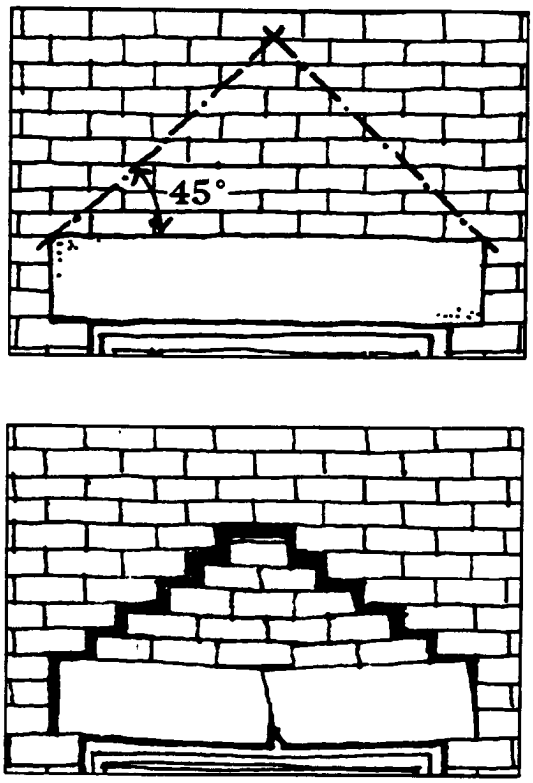


Figure 4-14. The Collapse of Masonry Lintels Indicates a Structural Fault.

(Source: Respectful Rehabilitation: Masonry, The Preservation Press, National Trust for Historic Preservation)

to be flexible yet durable. The conditions that should be abated or prevented in these materials are corrosion, abrasion, movement, and impact.

4.6 MECHANICAL SYSTEMS/HVAC. Most historic buildings that are used as living or work places need modern heating, cooling, and ventilating systems, as well as up-to-date kitchens and bathrooms. The most important consideration in installing these systems is not how to hide them, but how to protect the historic fabric of the building. You may find it surprisingly easy to do both if you take time to examine the building closely before beginning a new installation. Closets, pantries, and service areas in basements and wings can often be used for modern bathrooms, kitchens, and utility rooms. Many 19th century buildings were built with central heating and ventilating systems that can be adapted for today's air conditioning or wiring needs. Ducting for central A/C can sometimes be installed using old chases, or floor vents may be added for ducts rising from the basement. Other locations to consider: between roof deck and ceiling (but only if new roofing is being installed) ; within roof

or ceiling structure (but only within original suspended or furred ceiling); between structural sub-floor and flooring (within non-structural fill or between sleepers); exposed in cellar, bottom floor, and crawl space (in service areas only); trenching below building (if soil and groundwater conditions permit); within walls (in existing furred spaces or new built out spaces) ; within furring over structural members; above beam flanges, on top of cornices or other concealed locations. Do not cut away portions of historic woodwork or cornices to install new work.

When installing water pipes, electrical conduits, and ducts, be careful not to cut through beams and floor joists, especially near the bearing or in the upper and lower third of the member. While the floor or ceiling is open, inspect and repair bearing members that have been undermined by earlier plumbing installations. Reinforce weakened members with wood or steel scabs.

Security and fire detection and suppression systems can often be installed using the same precautions.

The use of fan-coil air conditioning units to cool rooms may be desirable. They require only piping installation in the historic fabric, and they can be located unobtrusively beneath windows and painted to match wall finishes. Through-wall room air conditioners should be avoided. If window units must be used, they should be mounted on side or rear walls, and wall surfaces should be protected from dripping condensation. For central heating and air conditioning, locate grilles and vents in inconspicuous places.

Vibrations from air-conditioning condensers and other machinery may be harmful to old structures. Special care is required to dampen vibrations in attic and roof-mounted equipment. Do not suspend systems from attic roof rafters. Roof-mounted air-conditioning systems should be located so that they cannot be easily seen from the ground.

You may occasionally come across historically interesting mechanical equipment or decorative elements in unlikely places. These items could be marble counters and stalls in bathrooms, brass or bronze lavatory faucets, door handles, or stall connectors. These should be preserved and used where they are, if feasible.

Be alert for corrosion and leaks in piping systems over 30 years old. Maintain valves, such as radiator valves, and replace seats and rings every few years. Install water hammer arrestors as needed to prevent vibration. Maintain traps and air vents on steam systems to keep condensate from fountaining from the vents when the system starts up. Maintain water treatment systems to prevent corrosion in piping.

4.7 ELECTRICAL SYSTEMS AND WIRING. New lighting and electrical systems should not intrude visually or physically on old materials and features. Wiring can often be fished through existing chases, or unobtrusively surface-mounted if necessary. Electrical outlets should be mounted in plaster walls rather than in historic baseboards. If wiring cannot be concealed, use metallic surface raceways, carefully attached to avoid damaging historic materials, and painted in the same finish colors as the adjacent surfaces. Run the wires in inconspicuous places--along molding edges, for instance, rather than across flat wall surfaces. Remove inactive telephone wires. Run new wires at floor level rather than on top of baseboards.

Do not surface-mount junction boxes on walls and exteriors. Keep wiring to a minimum on exposed surfaces, especially on the exterior of the building. (See Figure 4-15.) High-intensity modern lighting systems are not appropriate for use on a historic building.

Historic ornamental lighting fixtures, such as chandeliers and sconces, should be retained as part of the building fabric. Often, they can be rewired and used for general illumination or indirect lighting. If you find piping for old gas lighting fixtures (often left in place when electricity was added), try to use the piping as conduit for electrical wires for the new lighting system. This avoids having to cut and repair original finishes. Check the ceiling mounting system for chandeliers any time the ceiling is open and accessible, and repair any weakened conditions. Old knob-and-tube wiring (sometimes found in attics or concealed areas) should be replaced. Inspect old wiring for fraying or rubbing against structural members.

4.8 ROOFS AND COVERINGS, WATER DRAINAGE. Besides being a historic buildings most important protection from the elements, the roof is one of the building's most important historic design features. Its shape, features (such as cresting, dormers, cupolas, and chimneys) , and the size, color, and patterning of the roofing material, are all "character-defining" elements that must be preserved.

- Do not change roof shapes or add features such as skylights, especially if they will be visible from the street.
- Preserve historic roofing materials and repair in-kind when possible. Copper, lead, lead-coated copper, tin, terne, stainless steel, galvanized iron roofing materials, as well as metal shingles, are readily available.
- Replace only the damaged sections.
- Use replacement materials that are identical to the originals in color, size, finish, and reflectivity.

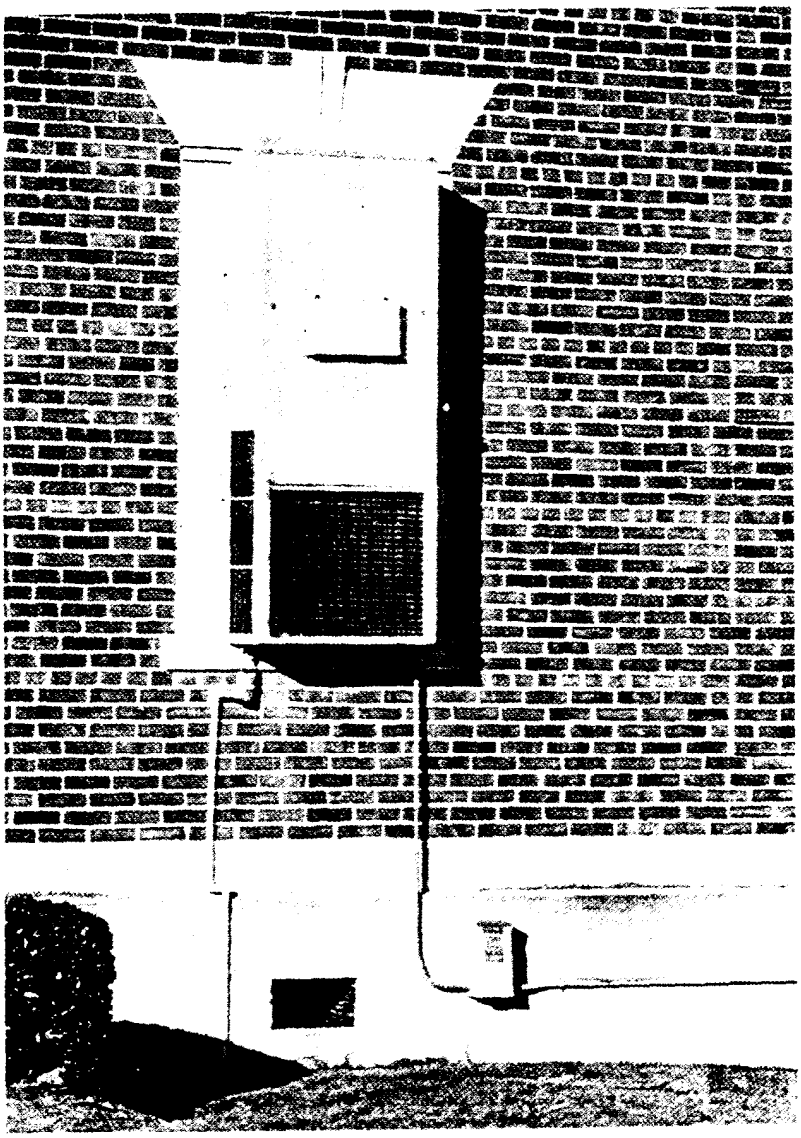


Figure 4-15. Historic Window Inappropriately Closed In.

Window inappropriately closed in with HVAC unit and filler panel. Note also the utilities fastened to exterior wall.

(Photo by James C. Massey)

- **If the entire roof must be replaced, there may be acceptable modern substitutes that are cheaper, lighter in weight, or more durable than the originals.**
- **Do not remove original eaves, overhangs, and cornices. They are usually important design features. Repair if possible, or replace with exact replicas.**

- Balustrades are prone to decay and need frequent inspection and painting.

- Replace all woodwork with the correct historic sizes. Old lumber dimensions are often larger than modern dimensions. Small differences will be obvious when the new work is in place. New millwork for cornices, balustrades, and other such features is available from millwork firms that specialize in historic work.

- Inspect lightning rods mounted on roofs. Install additional rods on roofs if required by code.

4.8.1 Roofing Materials. A wide range of materials were used on historic roofs. Repair or replace in-kind if the roof is visible.

- Copper Roofs. These are among the best roofs but are very expensive. It is usually better to allow new copper roofs and flashings to weather naturally than to use chemical washes to age them.

- Slate Roofs. A good slate roof can last 50 to 100 years, but slate varies in quality. Historic building roofs constructed of inferior slate will need earlier replacement. Slate roofs are easily damaged by impact (such as from falling tree branches or workmen walking on the roof) and fire.

  Repair slate roofs by replacing only the damaged slates. If the deteriorated area is large, remove the slates and discard any broken ones. Reuse old slates in the areas that show, and install new ones elsewhere.

  Do not use iron or steel nails on slate roofs. The nails will eventually rust, and the slates will fall off. Copper nails are best, but galvanized nails can be used if copper won't penetrate the slate.

  Do not walk on slate roofs.

  Do not "torch" (fill in between and beneath slates with mortar) . This keeps moisture from evaporating and can cause wooden battens and rafters to rot.

  Remove organic growths such as moss, algae, and lichens.

- Tile Roofs. Barrel tile (Spanish tile) and flat tiles also have a long 'potential life.

  Use galvanized nails to prevent corrosion damage to tiles. Watch for acid and frost damage.

- Match replacement tiles to the originals for color, size, thickness, and type of tile.

- Install new tiles with same weather exposure as the originals.

- Do not walk on tile roofs.

o Wood Shingle Roofs. When repairing a wood shingle roof, use long life materials. Use modern fire-rated wood shingles when they are available. (See Figures 4-16 and 4-17.)

- Replace damaged shingles with new wood shingles of same width, shape, and exposure to weather.

o Sheet Metal Roofs. If kept painted, galvanized sheet metal roofs last indefinitely. They may be standing-seam, flat-seam, or batten-seam.

- When replacing, keep the same shape and configuration as the original (i.e., standing-seam, flat-seam, batten-seam) .

- Do not walk on sheet-metal roofs.

o Lead and Lead-Coated Copper Roofs.

- Do not repair by soldering or using bituminous (tar) patches.

- Consult an experienced roofer if anything more than minor repair is needed.

o Tin or Terne Roofs.

- Use lead-coated fasteners or copper nails.

- Keep painted. Prime the underside and exterior of the metal with linseed oil and iron oxide primer paint; the exterior with an oil-based coat.

- Fill cracks with a non-shrinking caulk as a temporary measure only; Plan to replace.

o Galvanized Roofs.

- Repair sheet metal with similar material. Seal leaks with non-shrinking caulk, not with tar products.

- Paint metal roofs if they were historically painted or if base metal is showing through. Use historically appropriate colors.

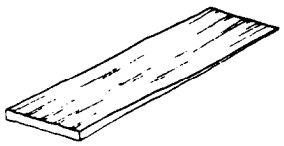
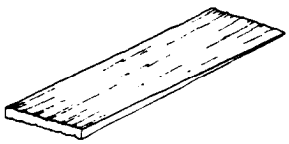
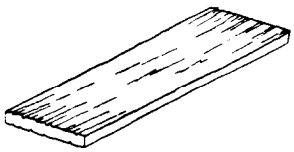
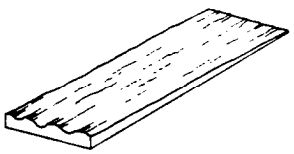
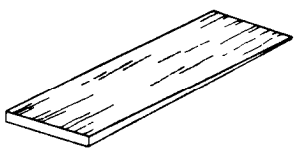
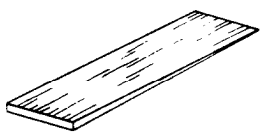
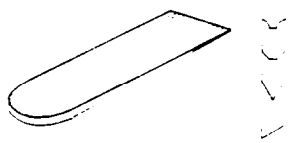
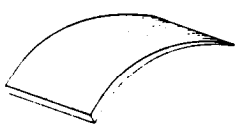
AVAILABLE WOODEN SHINGLES AND SHAKES FOR RE-ROOFING			
TYPE	SIZE	DESCRIPTION	NOTES
Custom split & dressed 	Made to match historic shingles	Handsplit the traditional way with froe & mallet. Tapered. Surfaces dressed for smoothness	Appropriate if: • Worked to match uniformly dressed original shingles
Tapersplit* 	Typically: L = 15", 18", 24" W = 4"-14" Butts vary 1/2"-3/4"	Commercially available. Handsplit the traditional way with froe & mallet. Tapered. Bundles contain varying widths & butt thicknesses. Surfaces may be irregular along grain.	Appropriate if: • irregular surfaces are dressed • butt thicknesses ordered uniform • wide shingles are split
Straightsplit 	Typically: L = 15", 18", 24" W = 4"-14" Butts vary mediums = 3/8-3/4" heavies = 3/4-1¼"	Commercially available. Hand or machine split without taper. Bundles contain varying butt thicknesses; often very wide shingles. Surface may be irregular along the grain. Thick shingles not historic.	*Not* appropriate for most preservation projects • Limited use of thin, even straightsplits on some cabins, barns, etc.
Handsplit* resawn 	Typically: L = 15", 18", 24" W = 4"-14" Butts vary mediums = 3/8-3/4" heavies = 3/4-1¼"	Commercially available. Machine split and sawn on the backs to taper. Split faces often irregular, even corrugated in appearance. Butt thickness vary and may be too wide.	*Not* appropriate for preservation projects
Tapersawn* 	Typically: L = 15", 18", 24" W = 4"-14" Butts vary 1/2"-3/4"	Commercially available. Made from split products with sawn surfaces. Tapered. Butt thicknesses vary and shingles may be too wide. Saw marks may be pronounced.	Appropriate if: • butt thicknesses ordered uniform • wide shingles are split • pronounced saw marks sanded
Sawn-straight butt 	Typically: L = 16"-.40 (<3/8") 18"-.45 24"-.50 (1/2") W = Varies by order	Custom or commercially available. Tapered. Sawn by circular saw.	Appropriate to reproduce historic sawn shingles
Sawn-fancy butt 	Typically: L = 16"-.40 (<3/8") 18"-.45 24"-.50 (1/2") W = Varies by order	Custom or commercially available. Tapered. Sawn by circular saw. A variety of fancy butts available	Appropriate to reproduce historic fancy butts
Steam-bent 	Varies by order to match, "Thatch" roofs	Custom or commercially available. Tapered. Thin sawn shingles are steamed and bent into rounded forms.	Appropriate to reproduce "thatch" shingles

Figure 4-16. Available Wooden Shingles and Shakes for Re-Roofing.

(Source: Presentation Brief, National Park Service)

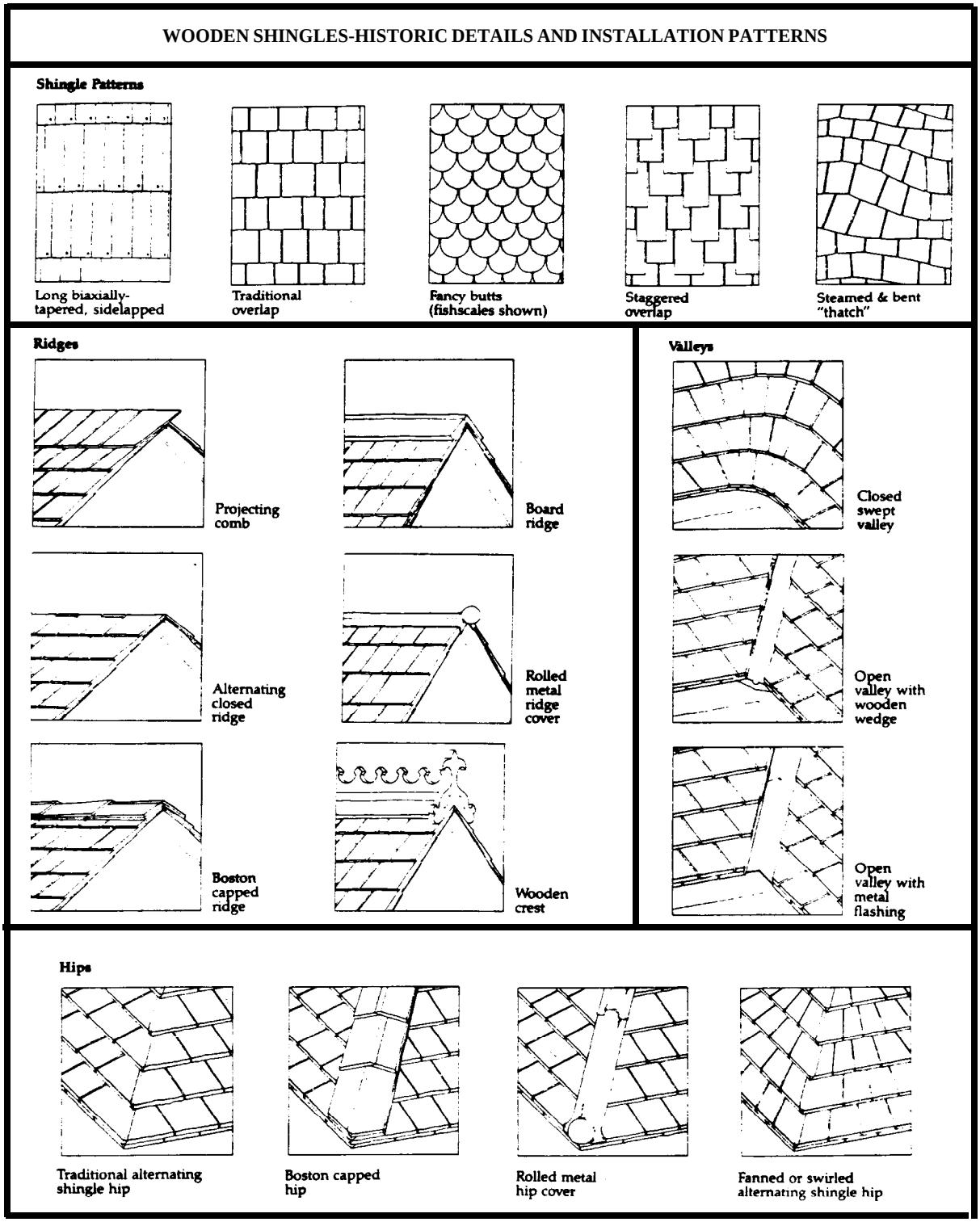


Figure 4-17. Wooden Shingles -- Historic Details and Installation Patterns.

(Source: National Park Service. Chart: Sharon C. Park; Delineation: Kaye Ellen Simonson)

- o Roll Roofing.

  Do not use asphalt or roll roofing on historic buildings except on flat roofs that are not visible from ground level. Membrane roofing is acceptable as a replacement on flat concealed roofs.

  If roll roofing was added over the historic material in an earlier rehabilitation, consider going back to the historic material when reroofing.

4.8.2 Water Drainage. To keep excessive moisture out of the building, maintain and repair flashing, gutters, and downspouts.

If the building does not have adequate flashing or gutter systems, add them. Install them in a way that will preserve the original appearance of the building.

4.9 EXTERIOR WALL SYSTEMS.

4.9.1 Masonry. In historic construction, stucco was usually applied directly on top of masonry walls without an intervening layer of lath. This makes the masonry more vulnerable to moisture infiltration through rising damp or water running down the wall. When repairing, consider adding expanded metal lath between the masonry and stucco layer. Respect decorative aspects of stone work. Do not remove or smooth over water tables, string courses, or other projecting elements. In repairing brick walls, be mindful of the original brick pattern and type of brick used. Match replacement bricks to the original in size, color, and texture. Repointed mortar joints should match the size, color, and tooling of the original as closely as possible. In repairing stone walls, match replacement stones to the original in size, color, and type of stone. Be aware that stone that looks identical to the original may have different weathering patterns.

4.9.2 Wood Frame. Most frame construction since the mid-19th century has been balloon framing, except for large wooden industrial buildings. Earlier historic framing was widely spaced post-and-beam construction. Post-and-beam construction continued much later in industrial buildings.

There are special problems of frame walls in historic buildings, including rot and deterioration, lack of insulation, structural failure, and deformation. Sills and other horizontal surfaces where water can stand are a particular deterioration problem.

- o Clapboards and Shingles. Repair board by board. Do not re-side the entire wall unless necessary.

- o Stucco Over Wood or Metal Lath. Early 19th century stucco was often placed directly over wood or solid brick walls to improve waterproofing. 20th century stucco was

installed over wood boards and lath, and later over metal lath. Old metal lath is subject to rust. In repairing stucco, it is best to use modern metal lath, installed on top of the old wood lath if possible. Test-patch stucco to recapture texture and degree of graininess of original, from sand to pebble finish. Stucco may crack or fall off if the keys fail because of rust, structural deformation, or vibration.

- Brick Veneer Over Wood Lath. Brick veneer is subject to bowing, cracking, and problems similar to those of stucco. Problems are less likely when the brick is backed by CMUs as in modern construction.

- Removing Permastone, Asphalt, or Asbestos Siding. In order to decide whether and when to remove asphalt siding, it is necessary to know how much damage is underneath the siding. Permastone should be removed whenever the opportunity arises. Asbestos siding must be referred to asbestos control.

- Vinyl and Aluminum Siding. Vinyl or aluminum siding should not be used on historic buildings. From the standpoint of historic preservation, there are three important reasons to avoid such sidings:

  1) It changes the historic appearance of the building because the texture and proportions of the new boards are different from the original wood siding. Worse yet, it may hide historic features such as cornices, window moldings, or carvings.

  2) The siding conceals existing or ongoing damage to the walls and original siding and makes repairs more difficult.

  3) The installation process itself may damage the original siding or other historic features.

  Studies have shown that, in the long term, it is not more economical to install and maintain aluminum or vinyl siding than it is to keep wood siding in good repair. Artificial sidings are not maintenance-free. They peel, pit, split, bend, and fade. Consequently, they may require repair or repainting in only a few years, and usually they must be replaced entirely within 20 years. Although they are sometimes advertised as being energy-efficient, aluminum and vinyl sidings have no significant insulation value.

- Painting Exterior Wood Walls. Whenever possible, clean wood walls; do not paint them. Paint when necessary; do not leave wood bare. Finish the walls with paint or stain as found in the original. When repainting, you may want to use the historic colors. A specialist in paint color

analysis can determine the historically correct colors with samples taken from an undisturbed (i.e., unstrapped and unweathered) wall section. When preparing to paint, clean the wall first, then scrape and sand the old surface; but do not strip it unless necessary. Do not use water on bare wood. Prepare the surface carefully: putty, spackle, repair splits, replace bad sections, sand and feather the edges of built-up paint. It is best to use the same type of paint when repainting.

- o Insulating Walls. Insulating an existing frame wall is often difficult. The cost and destruction of historic fabric is not generally justified unless the building is being completely resided or replastered. The amount of heat lost through walls is relatively small compared to that lost through windows, doors, and roofs. Concentrate insulation efforts in these more cost-effective areas. Do seal wall and foundation cracks. Do not use urethane foam insulation since, besides posing a health hazard, it retains moisture in the walls and cannot be removed without damaging the original materials.

- o Controlling Vapor Transmittal. When vapor barriers are used, they should be placed toward the heated side of the wall (toward the inside in cool climates, toward the outside in hot humid climates). Wood walls need to breathe. Do not over-insulate.

- o Enclosing Porches. Porch enclosures should not detract from the historic design of a building. Maintain the overall form of the porch, as well as cornices, columns, and trim. Exterior vestibules can be added to increase energy efficiency and convenience if they are carefully designed. The best place to put them is generally within an open porch.

4.10 WINDOWS. Whenever feasible, historic windows should be repaired rather than replaced. If they must be replaced, the new windows should be replicas of the old ones. Windows are an important design feature of most buildings, including warehouses and factories. They reflect the historic period, architectural style, regional characteristics, and technological development of the building. When they are changed, the historic appearance of the building is also changed.

In evaluating significance of windows, they should be considered historically or architecturally significant if they:

- o Are original;

- o Reflect the original design of the building:

- o Reflect the historic period or regional styles and building practices when the building was constructed;

- Reflect building changes from major historic periods or events; or

- Are examples of exceptional craftsmanship or design.

4.10.1 Window Surveys. Maintenance decisions should start with a window survey that records the condition of every window in the building. A window schedule listing all the parts of each unit, with space for notes on existing conditions and repair instructions, is helpful here. Start at the top of the historic-building maintenance treatment sequence, and do not take the next step unless it is necessary. Do simple maintenance first; repair as needed; replace damaged or missing parts in-kind; replace the entire unit in-kind only if it cannot be repaired. Do not give up too soon on the idea of repairing wooden or metal window sashes.

If a window must be replaced, make sure that the replacement matches the original exactly. (See Figures 4-18 and 4-19.) Custom-built or stock replacement windows suitable for most 19th and 20th century buildings are readily available commercially from specialty window companies. Good millwork shops can duplicate parts, such as muntins or bottom rails, which can be placed in the old sash. Consult the SHPO for help in finding replacement sources in your area. When selecting replacements, pay special attention to:

- Pattern of openings and their sizes;

- Proportions of the frame and sash;

- Configuration of the window panes and muntin profiles;

- Type of wood;

- Paint color;

- Characteristics of the glass; and

- Associated details such as hardware, arched tops, hoods, or other decorative elements.

Although reproduction handmade glass is commercially available, existing old glass that shows manufacturing irregularities such as bull's eyes, bubbles, and glass "streaks," or discoloration caused by age, should be protected during the repair process and reused if practicable. Decorative colored or stained glass and beveled glass is especially important for preservation.

Replace only as much of the historic material as is necessary. If the lower sash is decayed and the upper sash is sound, replace only the lower sash. If the sill is rotten, but the head and jambs are sound, replace only the sill.

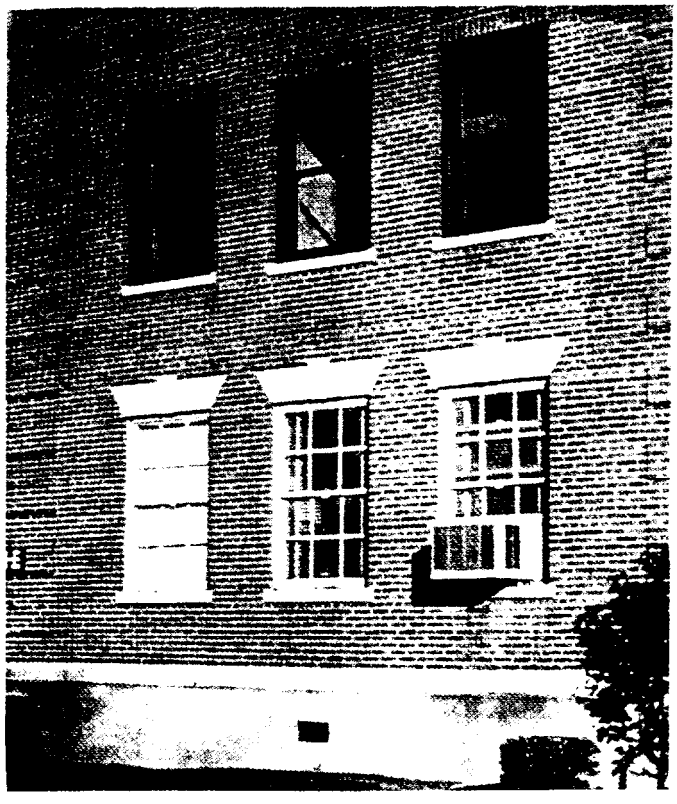


Figure 4-18. Historic Windows Inappropriately Replaced.

Historic windows have been inappropriately replaced with modern examples at the second floor, with an adverse effect on the historic character of the building.

(Photo by James C. Massey)

4.10.2 Maintenance and Repair of Wood Window Sash.

- **Check for wood decay. Dry the wood and treat with fungicide as needed.**
- **Replace or repair decayed wood using epoxies or by splicing with new wood.**
- **Prime dried-out wood with linseed oil before repainting.**
- **If windows will be repainted in the historic colors, do color analysis to determine the original colors before beginning to remove paint.**
- **Remove excessive or deteriorated paint as needed to make the windows work easily and provide a sound surface for repainting.**
- **Strip the paint using any appropriate method.**

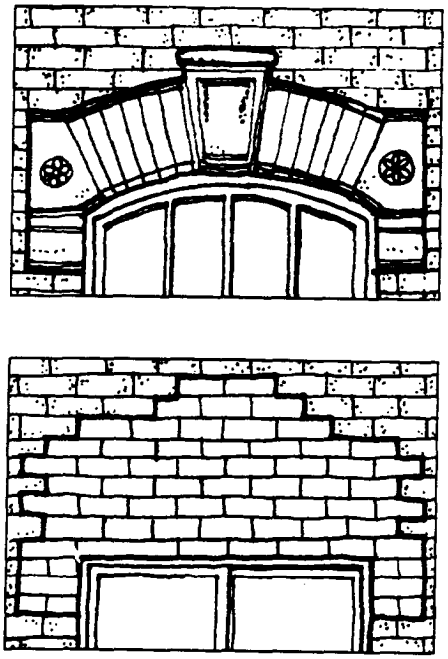


Figure 4-19. Filled-in Arch, An Inappropriate Repair.

An original arched window and decorative stone lintel have been removed, the arch filled, and a modern window installed. Not just inappropriate, but boring!

(Source: Dinu Bumbaru, Heritage Montreal Foundation)

- **Use care not to damage the profiles of the moldings with scraping tools .**
- **Sand carefully so as not to blunt the edges of the moldings.**
- **If a heat gun is used, either remove the glass from the sash or protect it from sudden temperature changes with gypsum board covered with aluminum foil.**
- **If the damaged areas are large, have replica frames or sashes custom made to match original the sashes and/or frames. (See Figure 4-20.)**

4.10.3 Metal Windows. If steel windows are basically sound, it is often more economical to repair and retrofit them than to replace them. Remove light rust, flaking, and excessive paint; then prime the exposed metal with a rust-inhibiting primer. Replace cracked or broken glass and glazing compound, replace missing screws or fasteners, and clean and lubricate hinges. (See Figure 4-21.)

DOUBLE-HUNG WINDOW: DOS AND DON'TS

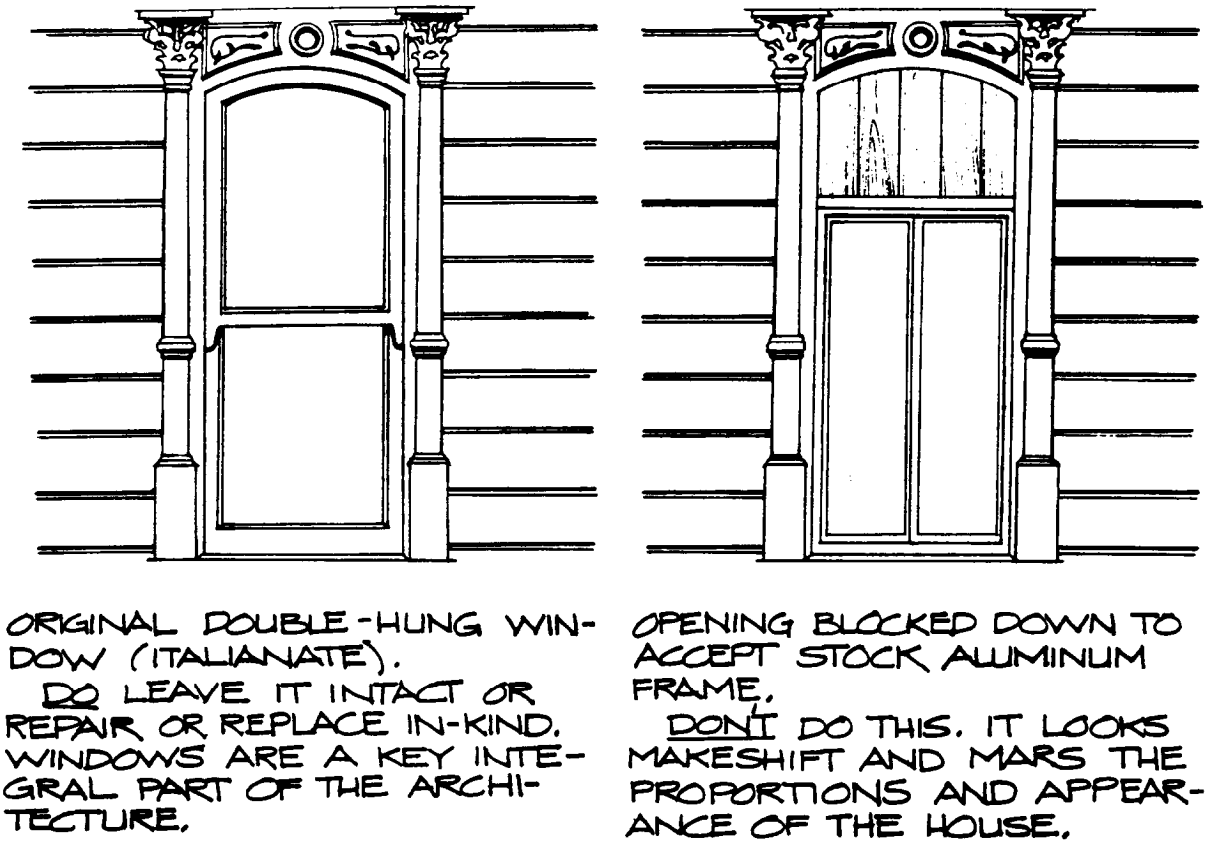
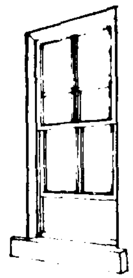


Figure 4-20. Double-Hung Window: Dos and Do nets.

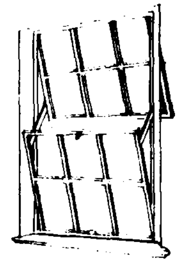
(Illustration: Blair Prentice, Rehab Right: How to Realize the Full Value of Your Old House, Copyright 1978 & 1986, City of Oakland, CA)

Rust and Paint Removal. Rust can be removed by hand with wire brushes or aluminum oxide sandpaper, or with a power tool such as an electric drill with wire brush or rotary whip attachment. (Protect adjacent window sills and jambs.) Chemical rust removers also work well; but do not use hydrochloric acid, as it leaves deposits that can cause further corrosion. Protect masonry and glass from chemicals with plastic sheets. Remove chemical residues from metal with damp cloths (not running water) and dry thoroughly immediately. Do not use oxy-acetylene or propane torches to burn off rust. Intense heat can distort the metal and break the window glass. It also vaporizes the lead in old paint. Low pressure sandblasting (80-100 pounds per square inch) using #10-#45 grit or glass pellets can be used to remove heavier rust (after removing the window glass). Bare metal should be wiped with denatured alcohol or other cleaning solvent, quickly wiped dry, and primed immediately with two coats of an anti-corrosive, oil-alkyd-based paint containing zinc or zinc chromate.

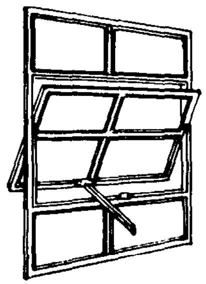
Double-hung industrial windows duplicated the look of traditional wooden windows. Metal double-hung windows were early examples of a building product adapted to meet stringent new fire code requirements for manufacturing and high-rise buildings in urban areas. Soon supplanted in industrial buildings by less expensive pivot windows, double-hung metal windows regained popularity in the 1940s for use in speculative suburban housing.



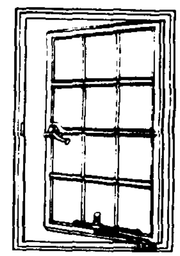
Austral windows were also a product of the 1920s. They combined the appearance of the double-hung window with the increased ventilation and ease of operation of the projected window. (When fully opened, they provided 70% ventilation as compared to 50% ventilation for double-hung windows.) Austral windows were often used in schools, libraries and other public buildings.



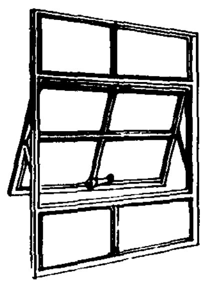
Pivot windows were an early type of industrial window that combined inexpensive first cost and low maintenance. Pivot windows became standard for warehouses and power plants where the lack of screens was not a problem. The window shown here is a horizontal pivot. Windows that turned about a vertical axis were also manufactured (often of iron). Such vertical pivots are rare today.



Casement windows adapted the English tradition of using wrought iron casements with leaded cames for residential use. Rolled steel casements (either single, as shown, or paired) were popular in the 1920s for cottage style residences and Gothic style campus architecture. More streamlined casements were popular in the 1930s for institutional and small industrial buildings.



Projecting windows, sometimes called awning or hopper windows, were perfected in the 1920s for industrial and institutional buildings. They were often used in "combination" windows, in which upper panels opened out and lower panels opened in. Since each movable panel projected to one side of the frame only, unlike pivot windows, for example, screens could be introduced.



Continuous windows were almost exclusively used for industrial buildings requiring high overhead lighting. Long runs of clerestory windows operated by mechanical tension rod gears were typical. Long banks of continuous windows were possible because the frames for such windows were often structural elements of the building.

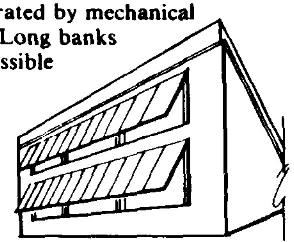


Figure 4-21. Types of Historic Metal Windows.
(Source: Sharon C. Park, National Park Service)

Repaint all steel sections with two coats of finish paint compatible with the primer. Caulk masonry surrounds with high quality elastomeric caulk.

Heavy Repair of Steel Windows. Bent or bowed metal sections can sometimes be straightened in place by applying pressure. Straighten bowed muntins with a wire cable and winch, applying progressively greater pressure over several days. (First, remove the glass and protect the muntins with 2 x 4 bracing). Bowed sections caused by corrosion may have to be cut and welded. Weld loose joints or replace decayed pieces with new steel. Patch small holes and uneven areas with auto body compound or plumbers epoxy. Most hinges and hardware on steel windows are made of bronze. Clean with mineral spirits, bronze wool, and clean cloths , and spray with a non-greasy lubricant.

- o Replacement. If a sash must be replaced, some manufacturers make rolled steel windows and can fabricate replicas for large orders. Standard, pre-World War II, multi-light windows using traditional 12" x 18" or 14" x 20" glass sizes are available in industrial, commercial, security, and residential configurations. Do not replace with sash using other materials, such as extruded aluminum or wood and vinyl, because they cannot match the thin profiles of rolled steel sections. If you need help finding product information, contact the Steel Window Institute, 1230 Keith Building, Cleveland, Ohio 44115.

4.10.4 Weatherizing Windows. Although historic metal windows are generally not energy efficient as built, they can be weatherized to a level that compares favorably with that of new windows. Caulking and weatherstripping are cheap and easy (if somewhat time-consuming) and have a fast payback period. Consider installing interior storm windows and low-emissivity (low-E) glass in the steel sash. If muntins are deep enough, it may be possible to use insulating glass. There are commercially available replacement windows that closely match the originals in appearance but have integral weatherstripping, thermal break construction, and insulating glass.

Caulking and Weatherstripping. Caulk around masonry openings to reduce air infiltration, then add weatherstripping. Spring-metal, vinyl strips, compressible foam tapes, and sealant bead types are all acceptable. Different circumstances call for different types of weatherstripping, and any given building may need more than one type of weatherstripping. Always use the thinnest material that will fill the spaces, since thick weatherstripping can spring hinges, causing more gaps.

Spring-metal clips are recommended for steel windows in good condition. Paint the window before installing weatherstripping to prevent galvanic corrosion of steel from contact with brass or bronze strip material. Do not apply stripping to the hinge side of casement windows.

- Vinyl stripping may be too thick for use in some situations.

- Compressible foam is best for large windows with only slight bending or distortion or with a gap of no more than 1/4". However, the foam must be replaced more frequently than spring-metal or vinyl.

- Sealant beads are good all-around weatherstripping for all types of metal windows and air infiltration problems.

4.10.5 Double Glazing. This process adds a second layer of glazing to the window glass. This will approximately double the original insulating value of the window. Options include:

o Glass or Acrylic Panels. Panels secured to the frame over the entire window are not suitable for windows needed for ventilation or fire exit since the panels make the sash inoperable. Magnetic interior panels can be attached to the sash. With acrylic panels, provide l/8" vapor bleeds to control condensation and prevent moisture damage. (The bleeds will increase energy loss slightly). Panels must be removable to allow excess moisture to be wiped away as needed. Considerations: cost , ability of window to support additional weight, location and size of window, long-term maintenance.

o Interior or Exterior Storm Windows.. May have to be specially fabricated to match original sash configuration (e.g., casement storms). Generally not suitable for operating windows that project on either side of the window frame when open, such as pivot and austral windows. Considerations: visual impact on building. Exterior storms can protect against damage to ornamental windows from air pollutants, vandalism, etc.

o Replacement Thermal Glass. The best but most expensive way to upgrade thermal efficiency is to replace the original glass with thermal or low-E glass. The new glass can usually fit in the existing metal sash and does not affect the appearance of the historic building.

4.10.6 Glass Block Windows. Glass block windows should be preserved and repaired with new glass blocks. The blocks are commercially available. For further Information:

Myers, John H., Preservation Briefs: #9, The Repair of Historic Wooden Windows; and Parks, Sharon C., AIA, Preservation Briefs: #13, The Repair and Thermal Upgrading of Historic Steel Windows.

Prepared by Technical Preservation Services, Preservation Assistance Division, National Park Service. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, or from your SHPO office.

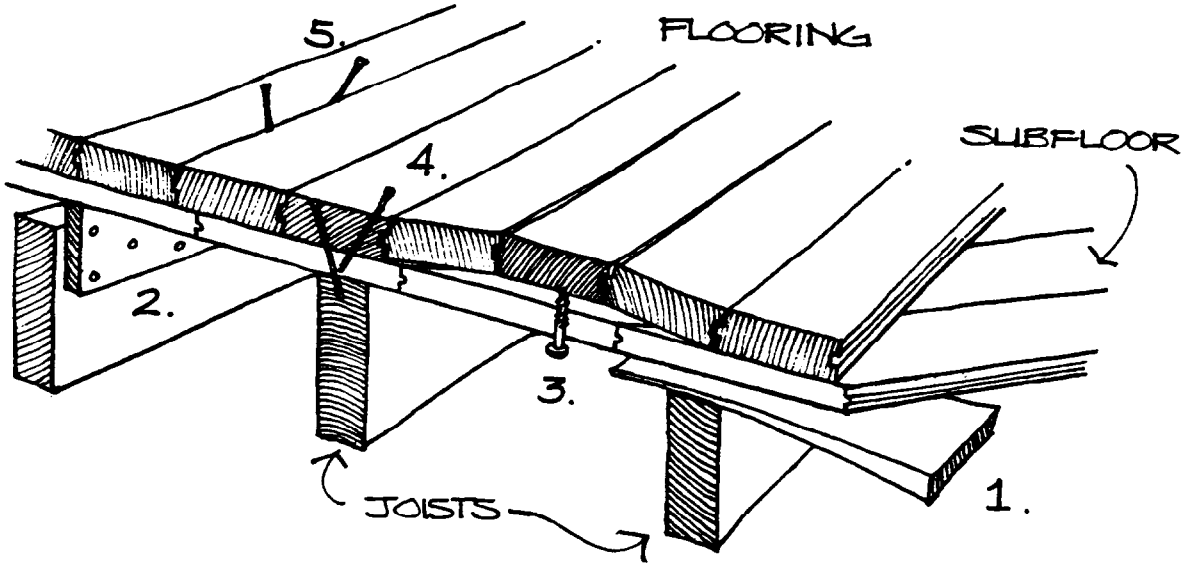
4.11 FLOOR SYSTEMS. Avoid installing manmade sheet flooring over historic floors. The mastic damages the wood surface, and removing it removes part of the wood beneath it. Wall-to-wall carpet should not be used over fine hardwood or marble. Area rugs are a better way to handle the design finish or sound control. Baseboards are part of the historic floor system. They should be preserved and repaired as necessary. Do not cut into them to install electrical boxes and outlets, heating or air conditioning vents, or telephone wires unless there is no alternative.

4.11.1 Wood Floors. Fine pine and hardwood floors may be found in buildings dating from the 18th to the 20th century. Floorboards range in width from more than 12" in the 18th century down to narrow oak or maple strips in the 20th century. The patina, or aged surface of the wood, is an important part of the floor. Strip, sand, and refinish only if necessary. Do not refinish with polyurethane. Remove any damaged sections and, whenever possible, reuse the original boards. Supplement old boards with infill boards available from lumber specialists. (See Figure 4-22.) Be especially careful with decorative parquet floors as the wood inlay is often loose. Reglue carefully with a reversible wood glue. Restoring missing or damaged parquet may require a specialist. Soft wood flooring is often found in 19th century buildings. It is easily gouged and scratched and may need protection in high traffic areas.

4.11.2 Masonry Flooring. Marble, stone, terrazzo, and ceramic tile floors are usually very important design elements. They should be carefully maintained and repaired. Marble and other stone floors should be repaired or replaced piece by piece. Do not use abrasive or caustic cleaning methods for stone floors. Terrazzo and ceramic tile floors are often overlooked as part of the historic building design. They should not be covered or replaced with manmade flooring. Historically, concrete floors were often intended to have a polished finish. However, many rough cement or concrete floors were covered with linoleum. Some linoleum in historic patterns is still available, but modern vinyl flooring is almost always a better choice for all but historic-house museum use.

4.12 DOORS. Like windows, doors are vital character-defining design elements in a historic building. Whenever possible, original exterior or interior doors should be kept and repaired and/or refined as needed. If they are too badly damaged to keep, they should be replaced with exact replicas. If old or original doors must be removed, save them to be reused at a later time or another place in the building, or to replace identical missing historic doors in another building. Unused sliding pocket doors are sometimes found between parlors and other rooms in Victorian houses. They should be returned to use if possible, or left unused in their pockets. Other historic doors that are not currently in use should not be removed; lock them in place and treat them as solid wall surfaces if necessary. New doors and

REMEDIES FOR LOOSE FLOORBOARDS



SUBFLOOR

1. IF JUST ONE OR TWO BOARDS ARE LOOSE, WEDGE A SHINGLE BETWEEN THEM AND THE JOIST.
2. IF SEVERAL BOARDS ARE LOOSE, BRACE A 1x4 AGAINST THE SUBFLOOR AND NAIL TO THE JOIST.

FINISH FLOOR

3. LOOSE FINISH FLOORING CAN BE TIGHTENED THROUGH THE SUBFLOOR WITH WOODSCREWS.
4. IF THERE IS A JOIST UNDER A SQUEAKY FLOORBOARD, ANGLE RIBBED FLOORING NAILS INTO JOIST. DRILL PILOT HOLES FIRST.
5. BETWEEN JOISTS, DRIVE 6d FINISH NAILS AT SLIGHTLY OPPOSING ANGLES INTO THE FLOORBOARD CRACKS CENTERED OVER THE SQUEAK. SPACE NAILS ABOUT 6" APART.

Figure 4-22. Remedies for Loose floorboards.

(Illustration: Blair Prentice, Rehab Riqht: How to Realize the Full Value of Your Old House, Copyright 1978 & 1986, City of Oakland, CA)

frames that are inserted into an original opening should fit the opening exactly in size and shape without adding filler panels. (See Figure 4-23.)

When refinishing doors and doorframes, keep or recreate the historic finish. Be particularly alert for the presence of fine woods such a walnut, cherry, or mahogany. The doors and woodwork in most late 19th century houses were stained and varnished, not painted. Sometimes only the door was varnished, while the rest of the woodwork was painted a solid color. However, some doors were painted to look like wood grain or marble. Often these old finishes can be restored by careful scraping. If the finish is too far gone to save, it can be recreated by a skilled painter, using the original finish as a guide. Whatever the original finish may have been, do not dip strip historic doors. Chemical baths weaken glued joints and veneer, destroy earlier finishes, and may damage the wood itself. (See Figures 4-24, 4-25, 4-26, and 4-27.)

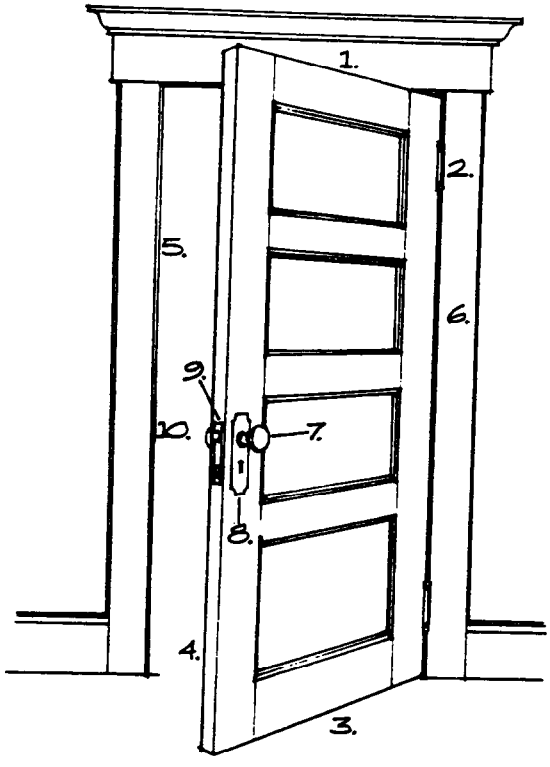
Some historic front exterior doors were secured with iron bars on the inside. If these bars are still there, keep them and use them if possible, rather than installing intrusive modern locks .

Doors in new partitions should not be replicas of original doors in the building and need not be reproductions of period doors. However, they should be in sympathy with the spirit of the building, using the same proportions and level of formality, as well as similar woods and finishes. Modern flush-panel doors are not suitable for use in historic buildings.

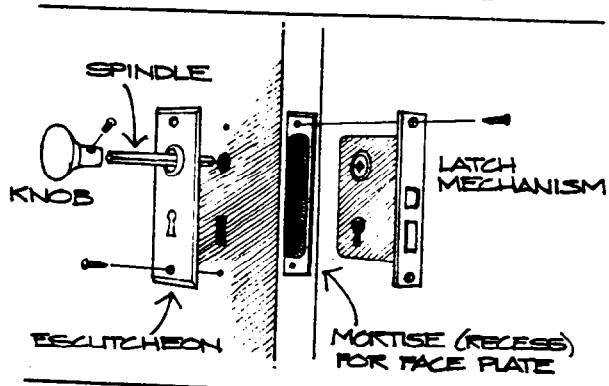
Transoms, fanlights, and sidelights add to the historical character of the door or building. They should be kept and reglazed if necessary. Do not replace them with filler panels. Do not paint out glass on or around doors. Leaded, beveled, or stained glass in fanlights and sidelights may need special consideration. Check the condition of lead tames on ornamental glass windows. If the tames are loose or glass is bowing, repairs should be made by a specialist.

4.13 HARDWARE AND METAL WORK. When old or original hardware exists on either the interior or the exterior of the building, it should be kept and refurbished or repaired as needed. Replacement hardware should reflect the period of the original decoration, not contemporary design. Do not add modern hardware, such as rim-mount deadbolts and other modern locks, to fine original doors. Old hinges, locks, and door knobs often have decorative finishes, such as carved surfaces. Some door hardware is plated in silver, nickel, or a silvery alloy called German silver. Old brass and bronze locks, hinges, and push plates, box locks , and iron box locks with porcelain or glass knobs all contribute to the character of historic buildings. Clean and lacquer the hardware if it will not get frequent use or polishing. Brass and bronze pieces that are frequently handled,

TYPICAL PROBLEMS ON INTERIOR DOORS



1. EDGES : MAY SWELL.
   SOLUTION: PLANING. (DON'T PLANE ON LATCH SIDE)
2. HINGES : CAN CAUSE STICKING WHEN LOOSE.
   SOLUTIONS : ADD CARDBOARD SHIMS, REMOUNT SCREWS AFTER PACKING HOLES FOR A TIGHTER FIT, OR SET MORTISES DEEPER.
3. BOTTOM : MAY SAG (BIND) ON LATCH SIDE.
   SOLUTIONS : SHIM OUT BOTTOM HINGE, RESET SCREWS OF TOP HINGE, OR DEEPEN MORTISE OF TOP HINGE.
4. DOOR PLANE : MAY WARP
   SOLUTIONS : TRY HOME REPAIR BOOK METHODS TO STRAIGHTEN, RESET STOP, REPLACE DOOR.
5. STOPS : WARPED DOOR OR STOP
   SOLUTION: MOVE STOP
6. DOOR JAMB : MAY SHIFT DUE TO SETTLEMENT OF HOUSE.
   SOLUTION: WORK ON DOOR ITSELF, NOT DOORJAMB.



7. KNOBS : KNOB MISSING OR REPLACED WITH ONE INAPPROPRIATE TO DOOR & HOUSE
   SOLUTION : FIND KNOBS MATCHING OR IN CHARACTER WITH ORIGINALS. OR, USE KNOBS FROM LESS CONSPICUOUS LOCATIONS SUCH AS CLOSETS.
   IF KNOB IS JUST LOOSE : TIGHTEN MACHINE SCREW THAT HOLDS KNOB TO SPINDLE (OBTAIN REPLACEMENT IF SCREW IS STRIPPED OR MISSING).
8. ESCUTCHEON : MAY BE TARNISHED OR PAINTED (ALSO HINGES, KNOBS FACE PLATES & STRIKE PLATES).
   SOLUTION: USE PAINT REMOVER (TAKE OFF OF DOOR FIRST) & BRASS POLISH. REPLATE IF NEEDED.
9. LATCH MECHANISM : CAN HAVE MECHANICAL MALFUNCTIONS.
   SOLUTIONS: CLEAN & OIL. IF THIS FAILS, CONSULT A LOCKSMITH OR FIND AN OLD LATCH THE SAME SIZE WHICH WORKS.
10. STRIKE PLATE : MAY BE OUT OF ALIGNMENT WITH LATCH, PREVENTING PROPER CLOSURE.
    SOLUTION: ENLARGE MORTISE ENOUGH TO MOVE STRIKE PLATE UP OR DOWN AS NEEDED.

Figure 4-23. Typical Problems on Interior Doors.

(Illustration: Blair Prentice, Rehab Right: How to Realize the Full Value of Your Old House, Copyright 1978 & 1986, City of Oakland, CA)

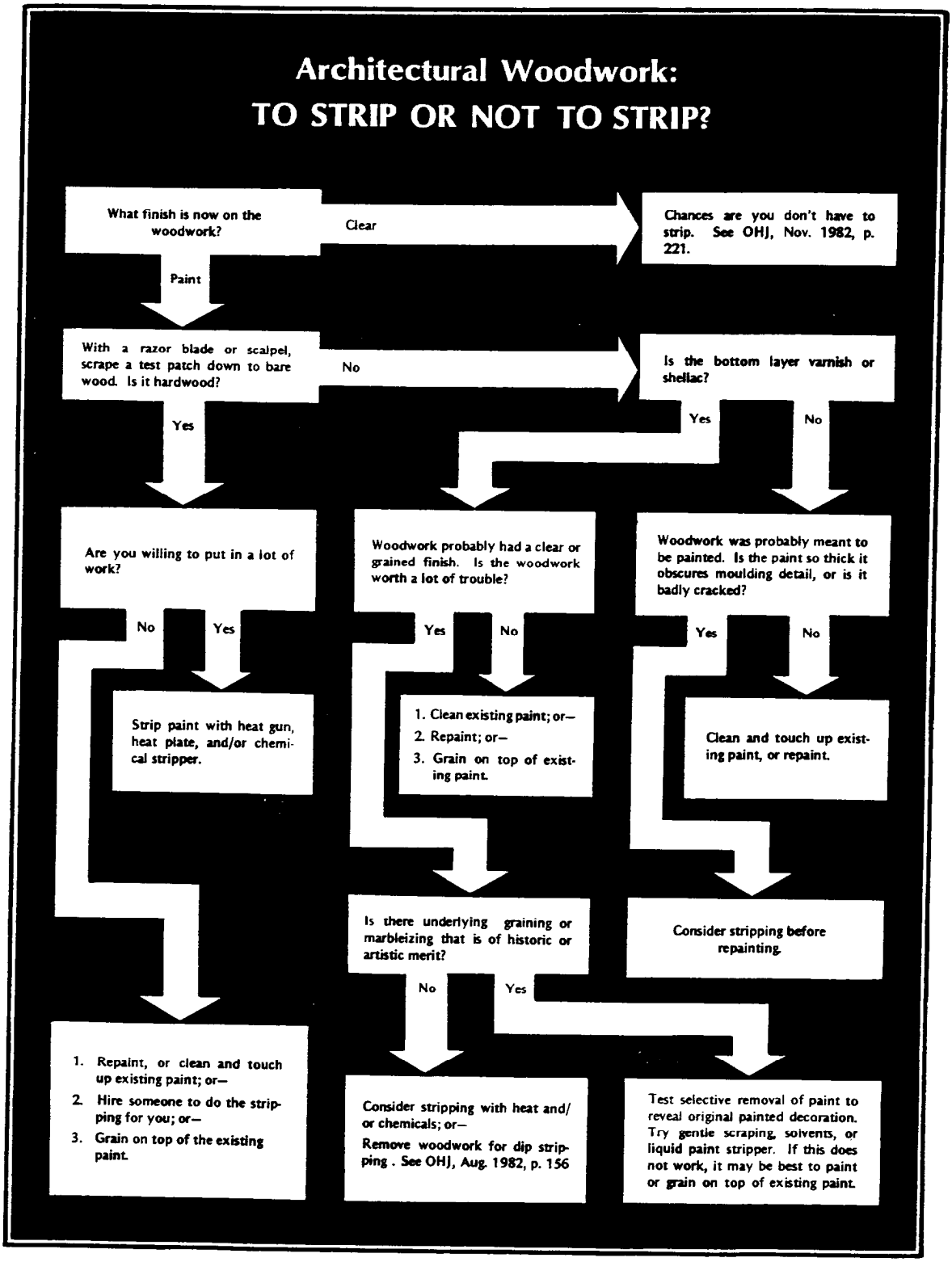


Figure 4-24. Architectural Woodwork: To Strip or Not To Strip? (Source: The Old-House Journal)

METHOD	RECOMMENDED?	GOOD FOR	LIMITATIONS	SAFETY CONSIDERATIONS
ABRASIVE METHODS				
BELT SANDER	No	Can be used to remove paint from large flat surfaces, such as clapboards.	Heavy and awkward to use, needs electrical cord, hard to control; can't reach into corners; creates a lot of dust.	Dust mask is essential to avoid inhaling or swallowing lead-containing dust.
DISC SANDER	No	Can be used to remove paint from large flat surfaces, such as clapboards.	Very light touch needed; otherwise you get circular marks in wood. Hard to control; can't reach into corners; needs electrical cord; creates a lot of dust.	Dust mask is essential to avoid inhaling or swallowing lead-containing dust.
ORBITAL SANDER	No	Can be used for smoothing a surface after paint removal.	Very slow; electrical cord needed; some dust created.	Dust mask is required.
HAND SCRAPERS	Yes	Can be used for paint that is not tightly bonded to wood; very versatile; requires no electrical cord.	Lots of elbow grease required. Must keep scrapers sharp; careful work essential to avoid gouging the wood.	Dust mask is recommended.
WIRE WHEELS; ROUND WIRES	No	Never use on wood,	Tends to gouge wood, especially where there are mouldings.	Eye protection required to guard against flying paint chips and broken wires. Dust mask is required.
WIRE WHEELS; FLAT WIRES	No	Can be used for removing loose paint from flat surfaces.	Electrical cord is needed; less control than hand scrapers. Very slow if paint isn't loose already.	Eye protection required to guard against flying paint chips and broken wires. Dust mask is required.
SANDBLASTING	No	Never use on wood.	Causes pitting and marring of wood. Hard to control; requires masking of adjacent surface-s. Creates a dust nuisance. Requires special equipment.	Requires appropriate respirator and eye protection.

Figure 4-25. The Various Ways To Remove Paint From Wood - Part 1
(Source: The Old House Journal)

METHOD	RECOMMENDED?	GOOD FOR	LIMITATIONS	SAFETY CONSIDERATIONS
HEAT METHODS				
HEAT PLATE	Yes	Can be used to remove paint from clapboards and other flat surfaces	Not effective on mouldings and carved work. Needs electrical cord; not effective on varnish. Can scorch wood if left too long in one place. Don't use near glass.	Wear gloves to avoid burns. Eye protection and dust mask recommended.
HEAT GUN	Yes	Can be used to remove paint from mouldings and solid decorative elements newels, bakers, capitals, doors, wain-scotting, door and window frames, etc.	Too slow for stripping exterior clapboards. Needs electrical cord; don't use near glass can scorch wood if left too long in one spot.	Tool could ignite dust inside hollow partitions such as cornices. Dust mask for micro-particulate lead recommended.
HEAT LAMP	No	Can be used to strip some flat work.	Difficult to control; needs electrical cord, can scorch wood if left too long in one spot	Eye hazard - special dark glasses required. Can ignite paint. Dust mask recommended
INFRARED TORCH	No	Stripping vertical surfaces.	Bulky to handle.	Possible fire hazard when held in non-vertical position. Dust mask recommended
PROPANE TORCH or BLOWTORCH	No	Don't use!	Will scorch wood don't use near glass.	Great lead poisoning hazard from micro-particulate lead. Vapor-type mask essential. Highest risk of fire.

GENERAL SAFETY NOTES:

1. Assume that any house built before 1950 has one or more layers of lead-containing paint. The scrapings, dust and sludge from paint removal operations should be heated as poisonous material. Local environmental regulations may dictate how to safely dispose of lead-containing paint scrapings.
2. When using any heat tool, such as an electric heat plate or electric heat gun, be sure to keep fire extinguisher handy.

Figure 4-26. The Various Ways To Remove Paint From Wood - Part 2
(Source: The Old House Journal)

METHOD	RECOMMENDED?	GOOD FOR	LIMITATIONS	SAFETY CONSIDERATIONS
CHEMICAL METHODS				
ORGANIC SOLVENTS (e.g. Methylene chloride strippers)	Yes	Stripping fine furniture; large-scale production stripping; window muntins; cleanup after heat tools.	Expensive not good for start-and-stop projects. Very messy; difficult cleanup and disposal.	Need plenty of ventilation. Eye and skin protection required.
LYE	No	Removes large amount of paint at low cost.	Raises grain; may also change color of the wood. Prolonged soaking may damage wood.	Eye and skin protection required.
CANNED POWDER STRIPPERS	OK	Can be especially useful in removing old casein and milk paints.	Messy; may raise the grain.	Eye and skin protection required.
PEEL-AWAY BLANKET	No	Can be used to strip paint from softwood woodwork.	Messy; slow-acting raises the grain; blanket must be washed to be re-used. Wood must be neutralized with vinegar.	Eye and skin protection required.

GENERAL SAFETY NOTES:

1. Assume that any house built before 1950 has one or more layers of lead-containing paint. The scrapings, dust, and sludge from paint removal operations should be treated as poisonous material. Local environmental regulations may dictate how to safely dispose of lead-containing paint scrapings.

2 When using any heat tool, such as an electric heat plate or electric heat gun, be sure to keep fire extinguisher handy.

Figure 4-27. The Various Ways To Remove Paint From Wood - Part 3 (Source: The Old House Journal)

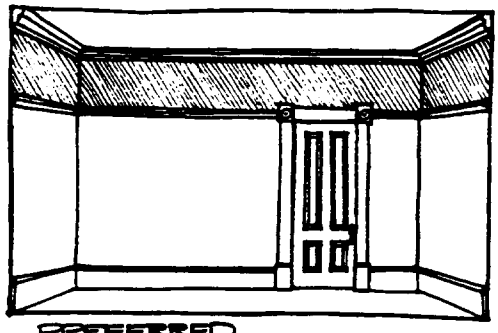
such as door knobs and push plates, should not be lacquered, since the lacquer will wear unevenly and make it more difficult to polish. Reproduction replacement hardware and parts are widely available from commercial sources.

4.14 INTERIOR PARTITIONS. The floor plan and room arrangement of a historic building are considered character-defining design elements. They should only be changed with great caution. Generally, new partitions can be installed in ways that will not permanently change or harm the historic materials. Do not remove important existing partitions. Do not install partitions that cannot later be removed without damaging the historic structure. Corridors are particularly important visual elements and should not be altered. Cornices, decorative elements, and ceilings are also important. Do not lower ceilings to install fluorescent lighting or to conceal wiring or HVAC requirements. Lowering the ceiling does not conserve energy. Acoustic ceiling tile panels should be added only if essential, and never in residential buildings. (See Figure 4-28.) New openings in partitions should be similar in scale and proportion to existing doors but need not be reproductions.

4.15 STAIRS. Stairways are among the most important decorative elements inside a historic building. In fact, in some simple buildings, they may be the only decoration or design distinction. They should not be enclosed, removed, or turned in a different direction. If the fire safety code requires enclosing the stair, consider enclosing the entire hall, not just the stairway. When creating such a stair hall, consider partitions of fire-rated glass rather than solid partitions. Do not replace wood, iron, or masonry railings and balusters with modern pieces. Whenever possible, install a new enclosed stair in another less important area, or install other safety features such as sprinklers.

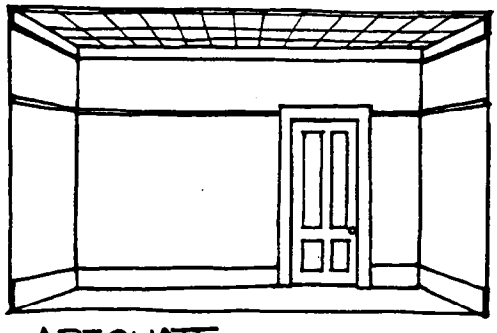
4.16 INTERIOR AND EXTERIOR FINISHES. Keep historic finish types, whether they be paint, stains and varnishes, wallpapers, wood paneling on walls or wainscoting, ceramic tile walls or floors, or simulated graining and marbling. Do not use polyurethane finishes on woodwork or floors. It cannot be removed without removing the surface of the wood. Reproduction ceramic tiles are often commercially available. Keep and repair “noble” materials, such as hardwood and marble and other fine stone. Do not paint over noble materials such as marble or limestone, etc. Remove paint if found. (Refer to Section 4.4.1.) Restoring finishes usually requires a specialist. If desired, reproduction wallpapers in historic patterns, including borders and ceiling papers, are widely available and should be used instead of modern design. Fireplaces are often of marble or other stone, or they may have decorative tiles, cast or sheet-metal mantelpieces, or faux-painted mantels and overmantels. Repair and refurbish them if possible, but do not remove them. Closed-in fireplaces might be reopened for historic

CEILING: DOS AND DONT'S



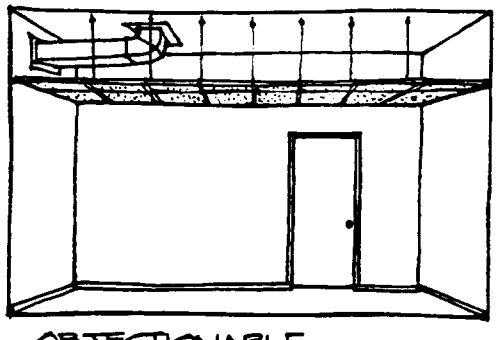
PREFERRED

ORIGINAL CEILING AND WALL TREATMENT OR SHEETROCK CEILING WITH MOLDING REPLACED.



ADEQUATE

NEW MATERIALS BUT PROPORTION AND LOCATION OF ORIGINAL ELEMENTS ARE RETAINED. PLAIN ACOUSTIC TILES ARE PLACED DIRECTLY UPON THE CEILING, ABOVE A MOLDING OF ADEQUATE WIDTH.



OBJECTIONABLE

LOWERED CEILING WITH HOLES OR HEAVY TEXTURE ON THE SURFACE OF THE PANELS. DECORATIVE ELEMENTS AND PROPORTIONS OF THE ROOM ARE DISREGARDED.

Figure 4-28. Ceiling: Dos and Don'ts.

(Illustration: Blair Prentice, Rehab Right: How to Realize the Full Value of Your Old House, Copyright 1978 & 1986, City of Oakland, CA)

decorative effect. Patch historic plaster walls or, if necessary, replace with new plaster over metal lath (but retain old wood lath). Do not replace with wallboard, except for small repairs. (See Figure 4-29;)

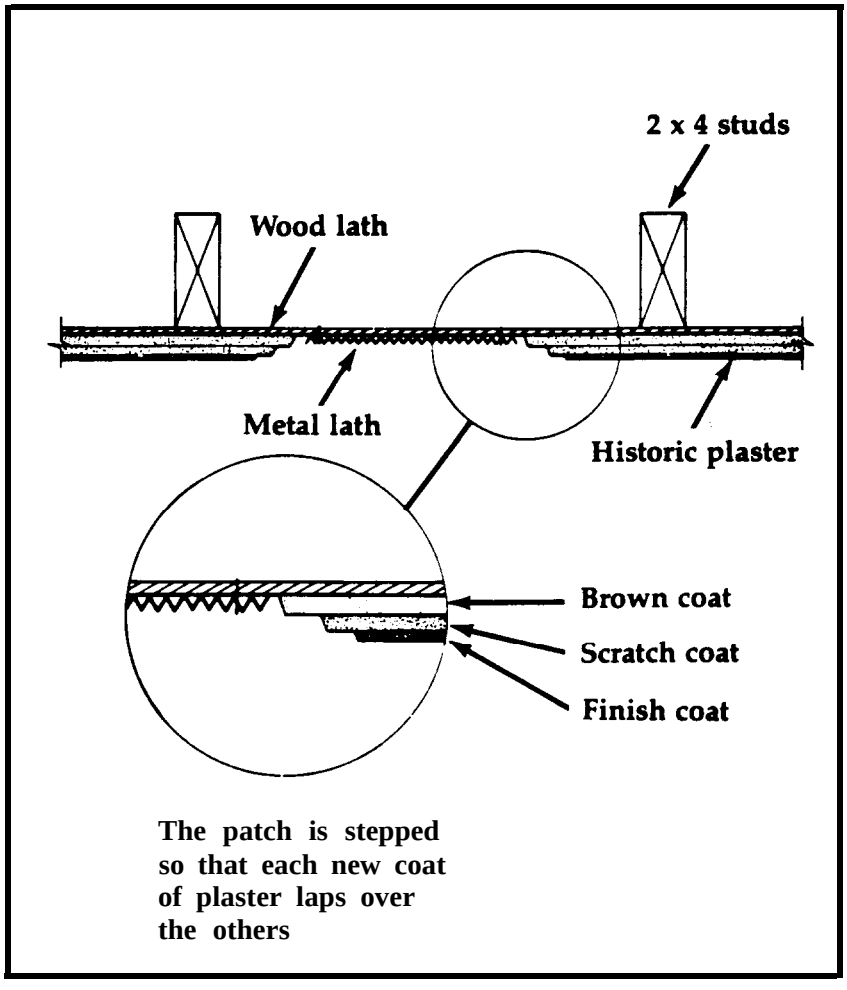


Figure 4-29. Repair of Old Plaster.

Patch and retain old plaster rather than replacing with modern wallboard. Keep the old wood lath in place when possible and install metal lath between old lath and plaster.

(Source: Preservation Briefs 21, National Park Service)

4.17 NEW AND SUBSTITUTE MATERIALS. There are only two good reasons to replace historic building elements or materials that have been lost or damaged beyond repair: to match visually what was there before and to prevent further damage to the feature or the building. The best (and often the cheapest) way to do this is to replace or repair with materials that are exactly like the originals. Most of the time, closely matching materials are available, although it may require research to locate them.

Sometimes, however, historic materials are not available, or the skilled craftsmen needed to fabricate or install them can not be found. Sometimes, the old materials do not work as well, do not last as long, or cost more than modern substitutes. Under certain circumstances the modern substitutes may be used instead of the original materials to make repairs or replacements on historic buildings. In addition to such tried-and-true choices as wood, stamped metal, or mineral fiber cement shingles, modern technology offers many less familiar materials that work well for certain repair or replacement chores, especially if they are used in places that are not seen up close. These substitutes look and behave much like the originals and can be installed without damaging historic features. They may or may not be competitively priced.

Caution: The use of vinyl or aluminum siding and molded urethanes as cosmetic claddings or substitutes for wooden millwork should be avoided. Millwork is still readily available and should always be replaced in-kind in exterior projects.

Carefully chosen substitute materials may be acceptable when:

- The historic material is no longer available, or when it cannot be delivered within a reasonable length of time.

- There are no skilled craftsmen available to repair the original feature in place or to install matching material.

- The historic materials are of poor quality or are not suitable for the use they were put to. Example: Early sheet metal roofs were made of tinplate, which corroded easily. The closest modern equivalent of tinplate is terne-coated steel, but the steel may corrode if the terne coating is scratched. A more durable (though more expensive) choice for a replacement roof on a historic building might be terne-coated stainless steel or lead-coated copper because these materials wear much better and look very much like the original tinplate.

- Building or life-safety codes require the use of specific modern materials or prohibit using the historic ones.

- The cost of the original material is prohibitive. Example: High-quality slate roofs can last sixty years or more with minimal maintenance. They may actually be more economical in the long run than other materials that cost less initially but need more frequent maintenance and replacement. However, if short-term cost has to be the deciding factor in choosing a replacement roofing material, a badly damaged or deteriorated slate roof might be replaced with mineral fiber cement shingles, which look very much like slate, cost considerably less, and can last twenty to twenty-five years if properly installed and well maintained.

- Substitute materials should be used only on a limited scale and after careful research. Learn as much as possible about the proposed materials, the fabricator, the installer, the specifications for use, and any previous experience with the material in a similar situation and similar environment. Some materials are too new to have a real track record. Although they may look promising, they should not be used unless the manufacturers, fabricators, and/or installers can supply satisfactory information on:

  - Appearance. Does the substitute material match the original in color, texture, shape, etc.? Will its use change the appearance of the building in any important way?

  - Physical Properties. Is the chemical composition of the new material similar to that of the original? Will it react in the same way to exposure to sunlight, moisture, pollution, and temperature changes? Will it expand and contract at the same rate? Will it absorb moisture in the same way? Does it have similar tensile and compressive strengths (i.e., does it react to weight and movement stresses in the same way as the original)? If the answer to any of these questions is no, can the new material be installed in a way that will compensate for the differences? Will differences between old and new materials cause damage to the historic fabric of the building? In old buildings, the historic material is almost always weaker than new material and needs to be protected from stresses caused by trapped moisture and uneven expansion and contraction rates.

  - Performance. Will the substitute material hold up over time? Will it need special care or frequent maintenance once it has been installed?

4.17.1 Cast Aluminum Attributes.

- Material. Cast aluminum is a molten aluminum alloy cast in permanent metal molds or in one-time sand molds. Color is from paint applied to primed aluminum or from a factory-finished coating. Small sections can be bolted together to achieve intricate or sculptural details. Unit castings are also available for items such as column plinth blocks.

- Uses. Cast aluminum can be used as a substitute for cast-iron or other decorative elements, grillwork, roof crestings, cornices, ornamental spandrels, storefront elements, column capitals, column bases and plinth blocks.

- **Installation**. If not self supporting, it is screwed or bolted to structural frame. Joint details are important because of galvanic corrosion problems when the cast aluminum comes in contact with dissimilar metals.

- **Advantages**.
  - Lightweight (1/2 that of cast iron);
  - Corrosion resistant;
  - Non-combustible;
  - Intricate castings possible;
  - Easy assembly;
  - Good delivery time;
  - Can be prepared for painting in variety of colors;
  - Long life;
  - Durable;
  - Less brittle than cast iron.

- **Disadvantages**.
  - Lower structural strength than cast iron;
  - Difficult to prevent galvanic corrosion with other metals;
  - Greater expansion and contraction than cast iron;
  - Needs gaskets or caulked joints;
  - Hard to keep painted.

- **Checklist**.
  - Can existing materials be repaired or replaced in-kind?
  - How is cast aluminum to be attached?
  - Have full-size details been developed for each piece to be cast?
  - How are expansion joints detailed?
  - Will there be a galvanic corrosion problem?

- Have factory finishes been protected during installation?

- Are fabricators/installers experienced?

4.17.2 Cast Stone (Dry-Tamped) Attributes.

- Material. Cast or dry-tamped stone is an almost dry cement, lime, and aggregate mixture that is dry tamped into a mold to produce a dense, stone-like unit. (Sometimes, cast stone is used as a generic term for precast concrete, but there are differences.) The outer surface of dry-tamped cast stone looks very much like stone. The inner core can be either dry-tamped or poured full of concrete, and reinforcing bars and anchoring devices can be added during fabrication.

- Uses. Cast Stone can be used as a replacement for unveined, deteriorated stone (e.g., sandstone, brownstone) or terra cotta that imitates stone. It can also be used for surface wall stones or for ornamental features such as window and door surrounds, voussoirs, brackets, and hoods.

- Advantages.

  - Closely resembles stone texture when made with good molds and fabrication;

  - Expansion/contraction similar to stone;

  - Minimal shrinkage of material;

  - Anchors and reinforcing bars can be built in;

  - Material is fire-rated;

  - Range of color available;

  - Vapor-permeable.

- Disadvantages.

  - Heavy units may require additional anchorage;

  - Color can fade in sunlight;

  - May be more absorbent than natural stone;

  - Replacement stones are obvious if too few models and molds are made.

- Checklist.

  - Are the original or similar materials available?

- How are units to be installed and anchored?

- Have performance standards been developed to ensure color stability?

- Have large samples been delivered to the site for color, finish, and absorption testing? Has mortar been matched to adjacent historic mortar to achieve a good color/tooling match?

- Are fabricators/installers experienced?

4.17.3 Precast Concrete Attributes.

o Material. Precast concrete is a wet mix of cement and aggregate poured into molds to create masonry units. Molds can be made from existing good surfaces on the building. Color is generally integral to the mix as a natural coloration of the sand or aggregate, or as a pigment. To avoid unsightly air bubbles that result from the natural curing process, great care must be taken in the initial and long-term vibration of the mix. Because of its weight, it is generally used to produce individual units of masonry, not thin shell panels.

o Uses. Precast concrete is 'generally used in place of masonry materials (e.g., stone or terra cotta) . It is used both for flat wall surfaces or for textured or ornamental elements (e.g., wall stones, window and door surrounds, stair treads, paving pieces, parapets, urns, balusters, and other decorative elements) . Unlike dry-tamped cast stone, surface texture is created by mold rather than hand tamping.

o Advantages.

- Easily fabricated, takes shape well;

- Rubber molds can be made from building stones;

- Minimal shrinkage;

- Can be load bearing, or anchorage system can be cast in;

- Expansion/contraction rate similar to stone:

- Material is fire-rated;

- Range of color and aggregate available;

- Vapor permeable.

- o **Disadvantages.**
  - — May be more moisture absorbent than stone, although coatings may be applied;
  - — Color fades in sunlight;
  - — Heavy units may require additional anchorage;
  - — Small air bubbles may disfigure units;
  - — Replacement stones are obvious if too few models and molds are made.
- o **Checklist.**
  - — Is the historic material still available?
  - — What are the structural/anchorage requirements?
  - — Have shop drawings been made for each shape?
  - — Are there performance standards?
  - — Has mortar been matched to adjacent historic mortar to achieve a good color/tooling match?
  - — Are fabricators/installers experienced?

4.17.4 Glass Fiber-Reinforced Concrete (GFRC) Attributes.

- o **Material.** GFRCs are lightweight concrete compounds modified with additives and reinforced with glass fibers. Generally, they are fabricated as thin shelled panels and applied to a separate structural frame or anchorage system. The GFRC is usually sprayed into forms, although it can be poured. The glass must be alkaline resistant in order to avoid deteriorating effects caused by the cement mix. Natural aggregates provide most of the color, with a small percentage of added pigments if necessary.
- o **Uses.** GFRC is used in place of features originally made of stone, terra cotta, metal, or wood (e.g. , cornices, projecting window and door trims, brackets, finials, or wall murals). It can be produced in long sections of repetitive designs or as sculptural elements. It can also be made from molds taken directly from the building. GFRC is installed with a separate non-corrosive anchorage system. As a predominantly cementitious material, it is vapor permeable.
- o **Advantages.**
  - — Lightweight, easily installed;

- Good molding ability, crisp detail possible;
- Weather resistant;
- Can be painted or left uncoated;
- Little shrinkage during fabrication;
- Molds made directly from historic features;
- Cements generally breathable;
- Material is fire-rated.

o Disadvantages.

- Non-loadbearing use only:
- Generally requires separate anchorage system;
- Large panels must be reinforced:
- Color additives may fade with sunlight;
- Joints must be properly detailed;
- May have different absorption rate than adjacent historic material.

o Checklist.

- Are the original materials and craftsmanship still available?
- Have samples been inspected on the site to ensure detail/texture match?
- Has anchorage system been properly designed?
- Have performance standards been developed?
- Are fabricators/installers experienced?

4.17.5 Fiber Reinforced Polymer (FRP) Attributes.

o Material. Fiberglass is the best known of FRP products. It is usually produced as a thin rigid laminate shell formed by pouring a polyester or epoxy resin gel coat into a mold. When tack-free, layers of chopped glass or glass fabric are added with additional resins. Reinforcing rods and struts can be added if necessary. Gel coat can be pigmented or painted.

o Uses. FRP is used where a lightweight replacement element is needed or where an inaccessible location makes frequent

maintenance of historic materials difficult. It is made to represent stone, wood, metal, and terra cotta in ornate or carved building elements (column capitals, bases, spandrel panels, beltcourses, balustrades, window hoods, or parapets) .

- o Advantages.
  - — Lightweight
  - — Long spans available with separate structural frame;
  - — High ratio of strength to weight;
  - — Good molding ability;
  - — Integral color with exposed high quality pigmented gel-coat, or takes paint well;
  - — Easily installed;
  - — Can be cut, patched, sanded; Non-corrosive and rot resistant.
- o Disadvantages.
  - — Requires separate anchorage system;
  - — Combustible;
  - — Fragile to impact;
  - — High coefficient of expansion and contraction requires frequently placed expansion joints:
  - — Ultra-violet sensitive unless surface is coated or pigments are in gel-coat;
  - — Vapor impermeability may require ventilation detail.
- o Checklist.
  - — Can original materials be saved/used?
  - — Have expansion joints been designed to avoid unsightly appearance?
  - — Are there standards for color stability/durability?
  - — Have shop drawings been made for each piece?
  - — Have samples been matched for color and texture?
  - — Are fabricators/installers experienced?

- Do codes restrict use of FRP?

4.17.6 Epoxies (Epoxy Concretes. Polymer Concretes) Attributes.

o Material. A resinous, two-part, thermosetting material used as a consolidant, an adhesive, a patching compound, and a molding resin. Can repair damaged material or recreate lost features. Resins, which are poured into molds, usually contain fillers such as sand or glass spheres, to lighten the mix and modify their expansion/contraction properties. When mixed with aggregates, such as sand or stone chips, they may be mistakenly called epoxy concrete or polymer concrete, but they contain no cementitious materials. Epoxies are vapor impermeable, which makes detailing of the new elements extremely important so as to avoid trapping moisture behind the replacement material. They can be used with wood , stone, terra cotta, and various metals.

o Uses. Epoxies are some of the most versatile of the new materials. They can be used to bind together broken fragments of terra cotta to build up or fill in missing sections of ornamental metal or to cast elements of wooden ornaments. Small cast elements can be attached to existing materials, or entire new features can be cast. The resins are poured into molds. Due to the rapid setting of the material and the need to avoid cracking, the molded units are generally small or hollow inside. Multiple molds can be combined for larger elements. With special rods, the epoxies can be structurally reinforced. Examples of epoxy replacement pieces include finials, sculptural details, small column capitals, and medallions.

o Advantages.

- Can be used for repair/replacement;
- Lightweight;
- Easily installed;
- Good casting ability;
- Molds made directly from building features;
- Material can be sanded and carved;
- Color and ultra-violet screening can be added;
- Takes paint well;
- Durable;
- Rot and fungus resistant.

- **Disadvantages.**
  - Materials are flammable and generate heat as they cure;
  - May be toxic when burned;
  - Toxic materials require special protection for operator and adequate ventilation while curing;
  - Material may be subject to ultra-violet deterioration unless coated or filters added;
  - Rigidity of material often must be modified with fillers to match expansion coefficients;
  - Vapor impermeable.
- **Checklist.**
  - Are historic materials available for molds or for splicing-in as repair option?
  - Has the epoxy resin been formulated within the expansion/contraction coefficients of adjacent materials?
  - Have samples been matched for color/finish?
  - Are fabricators/installers experienced?
  - Is there a sound substrate of material to avoid deterioration behind new material?
  - Are there performance standards?

CHAPTER 5. OTHER STRUCTURES

5.1 ENGINEERING, INDUSTRIAL, AND SHIPYARD STRUCTURES. In preservation terms, “buildings" are constructions created to shelter any form of human activity. They range from officers' quarters and barracks to hangars, warehouses, and maintenance shops . Traditional houses and similar structures are not the only type of construction that should be preserved. A wide range of facilities, including engineering, industrial, and shipyard structures, ships, and equipment, may have equal importance historically and so are protected under federal regulations. Historic structures and objects may range in age from the pre-Civil War era through World War II.

For example, Drydock Number 1, constructed 1827-34, is still in daily use at the Norfolk Naval Shipyard, Portsmouth, Virginia, the nation's oldest shipyard. Except for the replacement of its caisson, it remains as built. In addition to being listed on the National Register of Historic Places, the drydock has been designated a National Historic Landmark, the highest level of recognition for cultural resources. The great hammerhead crane at the Philadelphia Navy Yard is another outstanding engineering landmark that ranks among the most significant in the country (See Figure 5-l.). Among other significant structures are World War I-era seaplane hangars and ramps, which are especially significant in relation to the Navy's role in the early development of aviation. Other important historic structures include dirigible hangars, radio towers, gun factories and their cannons and guns, and quonset huts (WWII era) .

5.2 SHIPS. The preservation of historic ships is beyond the scope of this manual, but it is important to remember that ships may require preservation treatment. U.S.S. CONSTITUTION, one of the first three naval vessels of the United States (1797) and the oldest commissioned naval ship in the world, is a National Historic Landmark. The battleship U.S.S. MISSOURI, scene of the formal surrender of the Japanese at the close of World War II, is one of several Navy ships that have been listed on the National Register. Decommissioned in 1955, the ship was retrofitted and reactivated in 1986. The World War II submarine U.S.S. SILVERSIDES (now in Chicago) is also listed. Other ships have been decommissioned and passed on to outside organizations and agencies for preservation and management (e.g., Commodore George Dewey's ship, U.S.S. OLYMPIA, used at Manila Bay in the Spanish-American War). During the past twenty years, there has been increasing interest in maritime preservation generally, with a number of new public and private programs. There are federal standards for the documentation and presentation of historic ships, and the Historic American Engineering Record (HAER) has

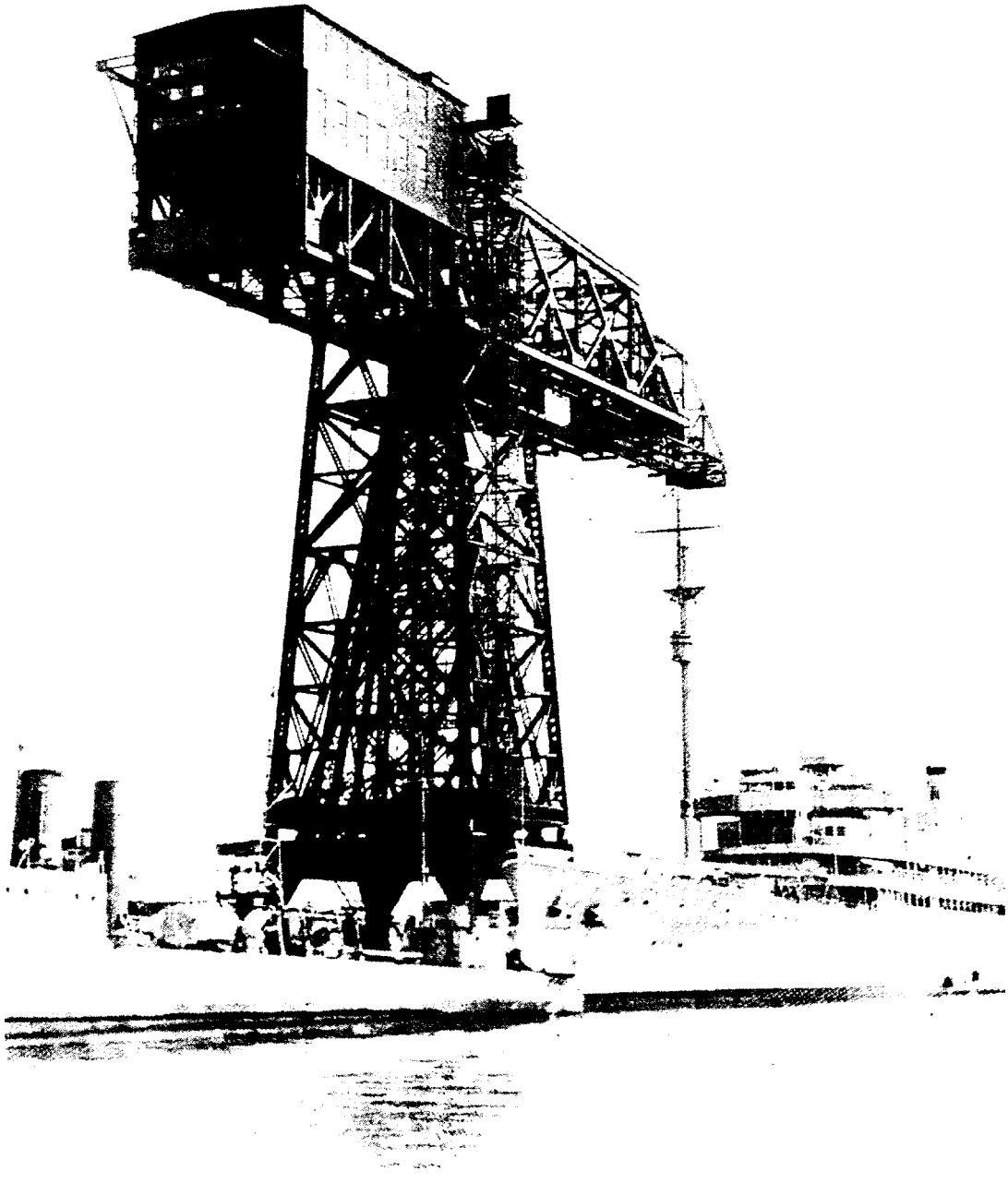


Figure 5-1. Hammerhead Crane at Philadelphia Navy Yard.

(Source: U.S. Naval Historical Center Photograph)

published detailed procedures for recording ships by means of measured drawings and photographs. All pre-1946 ships should be evaluated according to the National Register's criteria of significance.

Historic structures and objects such as these are preservation puzzles. While many continue in use (and undergo repair and updating) , their historic integrity needs to be recognized and protected. When a historic facility or object is taken out of service, the best method of preservation may be mothballing to protect it from decay or collapse. Finding new uses for historic structures and equipment is not as simple as it is for historic buildings. Hangars, for instance, may be made into offices or workshops without destroying the historic fabric of the building; but cranes, drydocks, and ramps may not be easy to adapt to other purposes. Functional additions may be made if care is taken not to harm the historical integrity of the structure. Handling nontraditional historic structures needs assistance from a specialist in industrial and engineering history or industrial archeology. In some instances, these structures are best left in place if they cannot be preserved and used.

It is important to survey and evaluate non-traditional facilities in order to separate those that are of distinct cultural importance, such as the ones noted above, from those that are merely old or that are less important because there are other, better examples elsewhere. Since it is especially hard to preserve working industrial facilities without change, this determination becomes critical. Historic preservation treatment may not be appropriate for some significant structures because of their continually evolving use. Formal documentation may satisfy the regulations in such cases. In other cases, historical integrity has been long lost, so they do not meet the National Register's criteria of significance and therefore need not be considered for preservation.

In cases of national emergency, such as war or a natural disaster, federal regulations may suspend the effects of the National Historic Preservation Act for varying periods of time (See 36 CFR 800.12).

CHAPTER 6. ARCHEOLOGY

6.1 INTRODUCTION. Of all the different kinds of cultural resources, the hardest ones to recognize and deal with are archeological sites. One reason is that there are so many of them. After all, people have been living in North America for at least 12,000 years. The traces they have left behind are what archeology is all about.

Then too, archeological sites can be almost anywhere and look like almost anything. They may be underground or under water, tucked away in caves or shell middens, lying in farmers' fields or backyard gardens, as well as in cemeteries, sewers, or hazardous waste sites. They may contain artifacts such as arrowheads or Civil War bullets strewn about at ground level or buried deep inside old privies or wells. On the surface, they may seem to be nothing more than a few random stones or a couple of old postholes filled with dark soil. Occasionally, as with some sites that are important in American Indian religious beliefs or tribal customs, they may contain nothing that can be seen or touched at all. They are frequently located in isolated places. Often, however, they are in places that somebody wants to use for a very good modern purpose that has nothing to do with the archeology *or* history of the site, such as a sewer line, a road, a hangar, or a gunnery range.

An archeological site is any area that contains information about our history (the period for which written records have been kept) or prehistory (the time before written records exist in a particular culture, such as early Native American settlements). Since there are so many of them, not all archeological sites can be considered important enough to list in the National Register of Historic Places or to require special treatment. The archeological significance of the site depends on how much information it is likely to yield and how important the information is likely to be. Although the information is about the past, it may be used to benefit the present or even the future, as with the study of various human diseases or the evolution of plants or animals.

6.2 POLICY, REGULATION AND OBJECTIVES. Like historic buildings and other cultural properties, archeological sites are protected under Section 106 of the National Historic Preservation Act. The Archeological Resources Protection Act of 1979 (ARPA), Public Law 96-95, made it a federal crime to remove archeological artifacts from sites on public lands without a permit. It is also illegal to buy, sell, or receive such artifacts.

6.3 EVALUATION, SURVEY AND IDENTIFICATION. The Navy is required by Section 110(a) (2) of NHPA to survey and evaluate all archeological sites that are potentially eligible for the National Register of Historic Places. The surveys and evaluations are carried out by professional archeologists and are done in consultation with the SHPO. The survey results are included in the historic preservation plans to be included in the base master plan. When projects are planned for areas containing archeological sites included in or eligible for the National Register, it will first be necessary to consult the SHPO and obtain the comments of the Advisory Council, pursuant to Section 106 of NHPA and 36 CFR 800.

From a maintenance standpoint, the most important thing to do about archeological sites is, before digging, filling, or building on a site, to be alert to the fact that they may be present and to take steps to protect them when you come across them. Base archeological surveys should be consulted before planning any new construction or demolition. They should give a good idea of whether a particular area is likely to contain important archeological data. However, not every potential site can be surveyed. If you find something in the course of your work that looks "archeological," stop digging and check it out. Do not remove any object from its location on the site; protect it in place if possible. Even objects that look sound may be incredibly fragile because of age and weathering. Note the location of the site and report your discovery immediately to the EFD (who will consult with the Secretary of the Interior, as required by the Archeological and Historic Preservation Act of 1974, for advice on how to deal with the site) so that arrangements can be made to evaluate and, if necessary, provide permanent protection for the archeological resource. The SHPO should be kept informed of such discoveries.

6.4 EXCAVATION. Ordinarily, "protection" means leaving the site alone and leaving artifacts, if there are any, where they were found (in situ). Small sample excavations may be done to decide how large the site is, how much and what kind of information it is likely to contain, and exactly where the information is most likely to be found. Full-scale archeological excavation, where large portions of a site are dug up and as many artifacts, or objects, as possible are taken out, is generally not done unless there is good reason to believe that there may be useful information that can best be gathered in this way.

Salvage archeology, i.e., when artifacts are removed for storage and study before a site has to be destroyed, must be left to experts. Usually the experts will choose not to disturb a site, since even the most careful digging causes a certain amount of destruction. Most sites that have been occupied once by humans have been occupied again and again, perhaps for different purposes or over a period of many years. The evidence of their occupation is found in layers, with the oldest evidence generally at the bottom level. Digging, sometimes even careful excavation,

rearranges the layers and can destroy the meaning of the evidence. It is somewhat like a murder mystery: in order to solve the crime you have to know exactly when and where it was committed, and you only want to find one set of fingerprints on the gun! Every time a site is disturbed, some evidence is lost. So the most useful site, the one that can answer the most questions about the past, is the one that has been least disturbed. Fortunately, technology is constantly being improved to allow archeologists to gather information by non-intrusive means, without digging into the site. For instance, remote sensing techniques such as ultra-sound and x-ray can often create a picture of what is inside the ground much as they help to see inside the human body.

Artifacts, as well as field notes and other items obtained from salvage of an archeological site on Navy land, are Federal property. The Navy is responsible for their preservation. Standards and procedures for the curation of these materials have been developed by the Secretary of the Interior and are found in 36 CFR 79.

6.5 UNDERWATER ARCHEOLOGY. Not all archeological sites are in the ground. Some, like shipwrecks or old coastal town sites or industrial sites that have slid into the water, are under water. These sites also are protected.

6.6 BURIAL SITES. Archeological sites that contain human remains must be treated with special care and respect. Any human remains, along with any objects found with them, that are discovered on Navy land are legally the property of the Indian tribe or other Native American group with which they were associated. They must be properly cared for by the Navy and, if requested, returned to their cultural group. Navy policy is to follow the guidance of the Secretary of the Interior in dealing with Native American human remains and associated funerary objects. In November 1990, Congress passed the Native American Grave Protection and Repatriation Act (PL 101-601) specifically to address the issue of ownership and control of such objects. The SHPO can usually be of assistance in identifying appropriate Native American contacts in these situations.

APPENDIX A
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APPENDIX B
GLOSSARY

Advisory Council on Historic Preservation (ACHP). An independent Federal agency tasked with advising the President, Congress, and other Federal agencies regarding historic and archeological resource preservation, formulating cultural resource protection policy, and reviewing Federal and federally-assisted undertakings that affect National Register properties.

Archeological Resource. Any material remains of human life or activity that is capable of providing information of past human behavior, culture, and related topics through a scientific or scholarly review.

Archeological Survey. A study to identify significant archeological remains or materials within a specific geographic area. The study is based on both literature research concerning the prehistory and history of the site and on field investigations. At Navy installations or activities, archeological surveys are usually conducted in two stages: (1) as part of an overview survey, a cursory initial study that is usually visual and with limited document research, which identifies known and potential archeological sites and (2) an intensive survey, a more detailed study that in turn consists of: Phase I, a field investigation conducted to locate any archeological resources; and Phase II, a study in which archeological resources identified in the overview or Phase I surveys are evaluated to determine their significance (eligibility for the National Register of Historic Places).

Architectural Resource. A building, object, structure or other man-made resource. An architectural resource can also be an element of landscape design such as a formal garden, park or parade ground, or an element of city planning such as the layout plan of a Navy installation.

Architectural Survey. An evaluation study by one or more qualified architectural historians in which a list is compiled of districts, buildings, structures, objects, and other man-made features. It evaluates potential for placing a resource on the National Register of Historic Places. At Navy installations, such surveys are usually conducted in two stages: an overview survey and an intensive survey. The overview survey is based on preliminary historic and visual survey of the property. The overview results in a list of resources that appear to be eligible for the Register and resources and areas that require further evaluation through an intensive building survey. The intensive survey is a detailed study involving additional historic research and completion of field survey forms on all districts, buildings, structures, and objects identified in the

overview survey. The intensive architectural survey provides a comprehensive list of districts, buildings, structures, and objects eligible for the National Register.

Building. A construction created to shelter any form of human activity. Examples of buildings on Navy installations include officer's quarters, barracks, hangars, warehouses, maintenance shops, and administration facilities.

Consultation. The act of seeking and considering the opinions and recommendations of appropriate parties about the National Register eligibility of historic and archeological properties and effects Navy undertakings may have on them. The SHPO and the Advisory Council are the usual consulting parties, although other agencies, interested publics and Native Americans may be included. Consultations may be informal, but they must always be documented in writing and follow the procedures found in 36 CFR 800.

Cultural Resource. Any building, district, site, structure, or other object of historical, archeological, architectural, engineering or cultural significance. Also called a "historic property."

Data Recovery. Recovery prior to destruction of information contained in archeological resources that are significant mainly for their value in scientific study.

Evaluation. A determination, through survey and documentation, of the value or significance of a resource by applying published National Register criteria.

HABS/HAER. The commonly used abbreviation for two closely allied units of the National Park Service: Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER). Both units provide information and assistance to federal agencies concerning standards, techniques and procedures for recording and otherwise documenting non-archeological cultural resources.

Historic. Of or related to an event, facility, object, site, or equipment that relates to the past.

Historic and Archeological Resources Protection (HARP) Plan. A plan prepared for the management and protection of the National Register resources of a Navy installation. By carrying out the goals and priorities and following the standard operating procedures of the HARP Plan, installations can achieve expeditious compliance with Federal historic preservation and archeological laws.

Historic District. A historic district is a definable area possessing a significant concentration, linkage, or continuity of buildings, structures, objects, or archeological sites. A district is defined by the association of its parts with past events , its looks, its layout, or its physical development. A

district may also be composed of individually significant architectural resources separated geographically but linked by historic associations.

Keeper of the National Register of Historic Places. The National Park Service official formally responsible for maintaining and publishing the list of cultural resources that meet National Register criteria of eligibility and for determining additions to and deletions from the National Register of Historic Places.

Memorandum of Agreement (MOA). The formal written agreement between\among the parties to a Section 106 consultation, pursued in accordance with 36 CFR 800. The MOA usually accepts adverse effects as being in the public interest and prescribes actions to be taken to reduce or mitigate the adverse effects. Upon execution by the Advisory Council, the MOA is evidence that the Navy has complied with Section 106.

Mitigation. Planning that is intended to minimize or eliminate damage to, or any other adverse effect on or incident to, a historic resource. Under the NHPA Section 106, a mitigation plan must be approved prior to the start of any undertaking involving National Register properties.

National Historic Landmark. A property designated by the Secretary of the Interior as having exceptional significance in the nation's history. National Historic Landmarks are automatically listed on the National Register and are subject to all preservation requirements.

National Register of Historic Places. The official national list of districts, buildings, structures, objects, and sites that are significant in American archeology, architecture, culture, engineering, and history, and have been determined to be worthy of preservation. The Register is maintained by the National Park Service.

Nomination. Formal notification to the Keeper of the National Register that a property may be of historical significance and appears to meet criteria of eligibility.

Object. A man-made feature that may be movable, but is related historically to a specific setting or environment. Examples include sculptures, cannons, mounted aircraft, anchors, ships bells, ship’s silver, monuments, foundations, pedestrian seats, and above-ground remains of a human event or activity.

Overview Survey. A survey conducted to determine the likelihood that National Register resources are present at a Navy installation or activity. The overviews are based on review of installation records and visual examination of potential archeological sites and possible historic districts, buildings, structures, or objects.

Preservation. The process of taking the necessary actions to prevent deterioration of historic structures.

Programmatic Agreement (PA) A written agreement among the Navy, the SHPO, and the ACHP that streamlines Section 106 review consultations. A PA stipulates how an entire program or class of undertakings repetitive in nature or similar in effect will be carried out so as to avoid or mitigate adverse effects on National Register resources. A PA permits the installation to proceed with certain classes of undertakings, provided that the National Register resources management strategies or other specified treatments are followed and any adverse effects are minimized.

Recordation. Drawings, photographs, and other formats permanently recording resources which must be destroyed or substantially altered.

Rehabilitation. The process of returning a property to a state of usefulness, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values.

Restoration. The act of returning a resource to the exact condition that it had at a specific time in history.

Significance. The attributes or characteristics of a resource that make it valuable and eligible for the National Register of Historic Places. Significance in a Navy resource is evaluated using the National Register Criteria for Evaluation (36 CFR 60.4) and any relevant historic contexts that have been developed for the installation.

Site. The location of a human event, prehistoric or historic occupation or activity, or structure. Examples of sites include battlefields, American Indian burial sites, and the location of demolished Navy buildings.

State Historic Preservation Officer (SHPO). The official appointed by each Governor to administer the state historic preservation program. This includes cooperating with Federal agencies to develop a comprehensive statewide inventory of historic properties and providing advice and assistance to Federal agencies in carrying out their preservation responsibilities.

Structure. A functional construction for purposes other than shelter, such as bridges or tunnels.

Treatment. The way an installation maintains, repairs, uses, protects, excavates, documents, or alters a cultural resource.

Undertaking. Any action, activity, program, or project financed, assisted, or licensed by the Navy that may have an effect on National Register resources, and therefore requires Section 106 consultation with the SHPO and the ACHP.

APPENDIX C
STATUTES, REGULATIONS, STANDARDS, AND DOD DIRECTIVES

C.1 STATUTES. A number of federal historic preservation laws apply to resources under the direct or indirect control of the Navy. These laws do not prevent the service from carrying out its primary national defense mission or, for that matter, from using its property in any way it considers best. The laws are meant only to ensure that all the potential effects on historic properties under federal control are considered before any action is taken that might harm them. Once the proper consultative procedures have been followed, the final decision on what to do with the property rests with the Navy.

C.1.l National Historic Preservation Act of 1966, as amended. The National Historic Preservation Act of 1966 (NHPA), as amended, is the backbone of today's historic preservation programs. Building on earlier legislation such as the Antiquities Act of 1906 and the Historic Sites Act of 1935 (see below), it expanded the National Register of Historic Places to include places of regional, state, and local, not just national, importance. It provided for the appointment of State Historic Preservation Officers in all the states. It established the Advisory Council on Historic Preservation (ACHP), an independent federal agency, to advise other agencies on what effects agency actions might have on historic properties and to advise the President and Congress on historic preservation matters. The NHPA also authorizes leases, exchanges and management contracts to be used for ensuring preservation of cultural resources and allows the Navy to retain proceeds from outleases to defray preservation costs.

C.1.2 Antiquities Act of 1906. The Antiquities Act of 1906 (16 U.S.C., 431-433), the first general, federal historic preservation measure, authorized the President to designate as national monuments "historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest" on federally owned or controlled lands. It also protected archeological sites by requiring permits for the examination of ruins, excavation of archeological sites, and gathering of objects of antiquity on lands under federal jurisdiction. (This function was taken over by the Archeological Resource and Protection Act of 1979.)

C.1.3 Historic Sites Act of 1935. This act (16 U.S.C., 461-467) made it a matter of national policy to preserve historic sites, buildings, and objects of national significance for the benefit and inspiration of the American people. It established the National Historic Landmarks program, still the highest level of federal recognition for historic properties, and provided for

the inventory and collection of data about sites of national significance. It also authorized the Historic American Buildings Survey, which systematically documents important historic structures through measured architectural drawings, photographs, and written data.

C.1.4 National Environmental Policy Act of 1969 (NEPA) (83 Stat. 852, 42, U.S.C. Sec. 4321). The Act established a national policy for the protection and enhancement of the environment, stating that it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the nation may preserve important historic, cultural, and natural aspects of our national heritage.

C.1.5 Archaeological Resources Protection Act of 1979 (ARPA),[16 U.S.C. 470aa-470mm) Public Law 96-96. An act requiring permits for archeological excavations on public lands and specifying penalties for unauthorized excavations or vandalism of archeological resources and providing for the preservation of archeological collections and data.

C.1.6 Archeological and Historic Preservation Act of 1974. Directs Federal agencies to notify the Secretary of the Interior whenever they find that a Federal, federally assisted, or federally licensed project may cause irreparable loss or destruction of significant prehistorical, historical, or archeological data. The Secretary of the Interior is authorized to undertake the recovery, protection, and preservation of such data, or in accordance with instructions from the Secretary, the agency is authorized to undertake such actions. The Secretary is further directed to coordinate all Federal survey and recovery activities.

C.2 REGULATIONS

C.2.1 Executive Order 11593 “Protection & Enhancement of the Cultural Environment May 13, 1971 (36 CFR 8921, 16 USC 470 et seg.). This order has been subsumed under Section 110 of the National Historic Preservation Act of 1966, as amended.

C.2.2 ACHP Regulations.

C.2.2.1 Section 106 of NHPA. Requires Federal agencies to give the ACHP an opportunity to comment before funds are approved for any federal undertaking that might have any effect on a National Register of Historic Places site, building, object, structure, or district under the direct or indirect control of the agency. The process is commonly known as Section 106 review. An ‘Undertaking” is any project carried out by a federal agency, or with federal funds, or with a federal license or permit. Regardless of whether the undertaking is expected to have a "beneficial" or an "adverse" effect on the property, it still

must be reviewed by the Advisory Council. Among the circumstances that lead to "adverse" effects are: 1) destruction or alteration of all or part of a property; 2) isolation from or alteration of the property's surrounding environment; 3) introduction of visual, audible or atmospheric elements that are out of character with the property or alter its setting; 4) neglect of a property resulting in its deterioration or destruction; and 5) transfer or sale of a property without adequate conditions or restrictions regarding preservation, maintenance, or use. A diagram of the basic steps for Section 106 review follows as Figure C-1. The implementing regulations for Section 106 are found in 36 CFR 800.

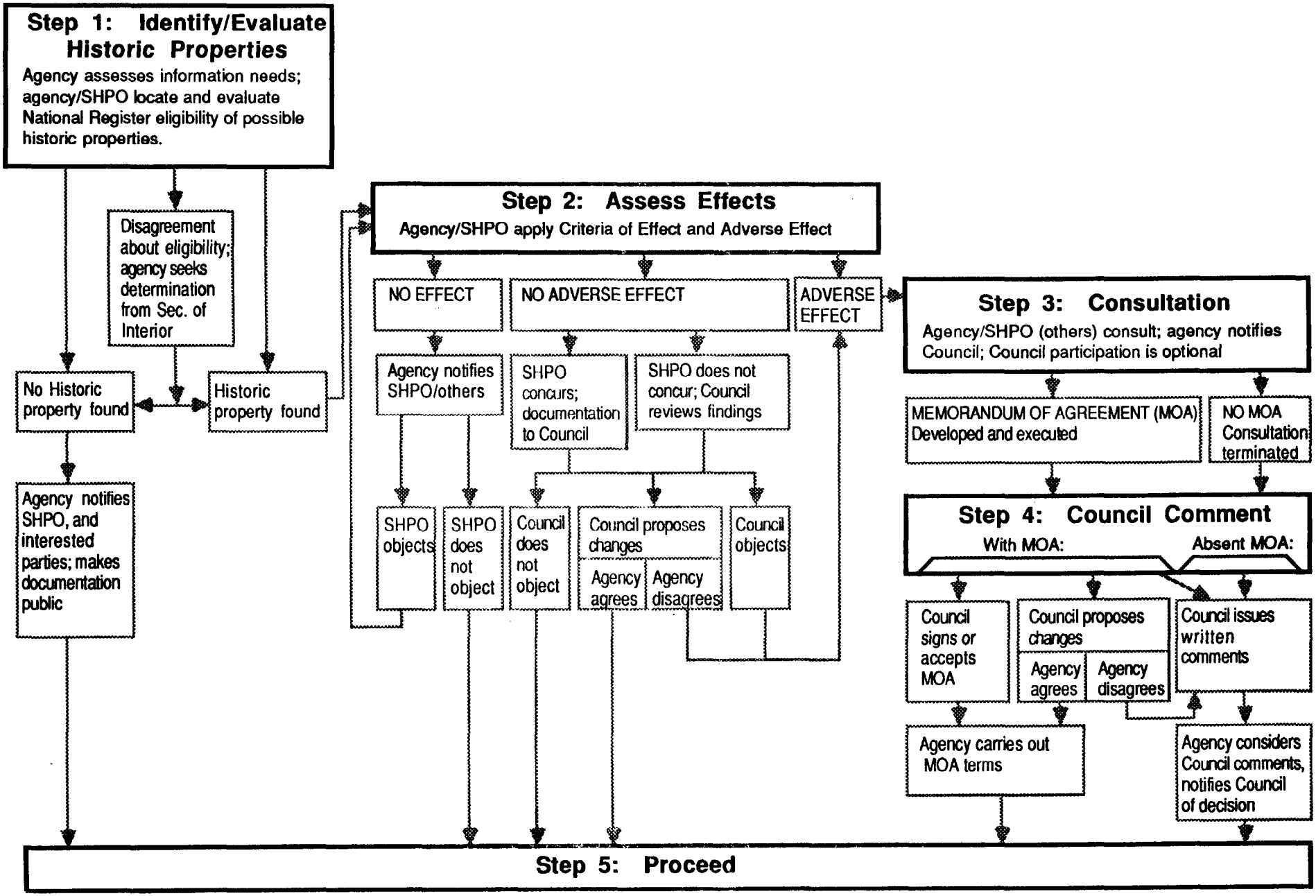
C.2.2.2 Section 110 of NHPA. Created by the incorporation of Executive Order 11593 into the NHPA through the 1980 amendments, this requires the Navy to locate and inventory all sites, buildings, structures, districts, and objects under its jurisdiction that appear to qualify for listing on the National Register. This is done with guidance from the Secretary of the Interior and with the cooperation of the SHPO for the state or territory involved. Activity commanding officers initiate the survey and inventory, which usually are carried out under contract by historic preservation professionals. The survey and inventory process is critical to the Navy's historic preservation planning, since the regulations for protecting historic and cultural properties under NHPA apply not just to properties which are listed on the National Register of Historic Places, but also to those which may be eligible to be listed, and even to those which have not yet been identified as potentially eligible. Specifically, Section 110 states that:

a. The Federal Government will ensure that Federal plans and programs preserve and enhance federally owned resources of historic or archeological significance.

b. Agencies in coordination with DOI and SHPOs will locate, inventory, and nominate resources that appear to qualify for the National Register.

c. Agencies will protect Federally owned assets that might qualify for the National Register. Assets will be protected from transfer, sale, demolition, or substantial alteration.

d. Agencies will ensure proper recordation of properties on the National Register that will be demolished or substantially altered. Records will be deposited with the Library of Congress for future use and reference. These records are made under the direction of the Historic American Buildings Survey and Historic American Engineering Record (HABS/HAER) pursuant to the Secretary of the Interior's Standards for Documentation.



THE BASIC STEPS OF THE SECTION 106 REVIEW PROCESS
FIGURE C-1

e. Agencies will maintain assets through preservation, rehabilitation, or restoration as prescribed by the NPS.

f. Agencies are required to submit annual plans on Historic Preservation to the Secretary of the Interior and the ACHP.

g. Agencies will cooperate with purchasers or transferors of National Register properties to develop appropriate preservation plans.

h. The Secretary of the Interior is tasked with encouraging State and local preservation officials to survey, evaluate and nominate non-federally owned properties to the National Register.

C.2.2.3 Memoranda of Agreement (MOA). MOAs are agreements reached among the Navy, the SHPO, and the ACHP that stipulate how an undertaking will be carried out to avoid or minimize adverse effect on a historic property. By carrying out the terms of the MOA, the Navy completes its responsibilities under Section 106. Failure to carry out the MOA requires going back to the ACHP for comment as if there had been no agreement. Programmatic Agreements are intended to deal with programs or classes of undertakings that are repetitive in character or similar in effect, so that such undertakings do not have to be individually referred to the ACHP.

C.2.2.4 World War II Temporary Buildings. Buildings constructed between 1939-1946 are exceptions to the rule that buildings must be at least fifty years old to be eligible for listing on the National Register. In 1986, the ACHP executed a Programmatic Agreement with the Department of Defense and the National Council of SHPOs that provides for the identification, evaluation, and documentation of World War II temporary buildings. The calls for the Department of Defense to develop a narrative overview of the historic and chronological development of World War II temporary building types and major military installations; to document representative major temporary building types and installations; and to develop historic preservation plans for select examples of World War II temporary building types or groups of buildings. Scheduled demolition is to proceed cautiously until the documentation study is completed. With the completion of documentation and agreement by the NCSHPO, and the Advisory Council, the Navy will have fulfilled its obligations under Section 106.

C.2.3 36 CFR 60, National Register of Historic Places. This regulation describes the procedures for nomination and listing properties into the National Register of Historic Places. It also describes related actions such as revisions to documentation, removals from the National Register, Public requests for action, and appeals to the Keeper of the National Register. Other functions of the register are to indicate

properties eligible for grants-in-aid or eligible for tax relief for historic preservation.

C.2.4 36 CFR 63, Determinations of Eligibility for Inclusion in the National Register of Historic Places. This regulation has been written to help agencies recognize and nominate the appropriate properties for the National Register. This regulation also explains how to request determinations of eligibility from the ACHP.

C.2.5 36 CFR 800. The Regulations for the Advisory Council on Historic Preservation. This regulation shows the charter for the organization and outlines the program of oversight and review to be followed.

C.2.6 State Regulations. Each of the states and territories and most local governments regulate historic properties in some fashion. It is Navy policy to cooperate with preservation agencies and organizations at all levels. The SHPO of each state is responsible for preparing a master preservation plan for his or her jurisdiction and must be consulted for help in identifying and evaluating historic properties and in assessing potential effects on them from Navy undertakings.

C.3 FEDERAL STANDARDS.

C.3.1 Secretary of the Interior's Standards for Archeology and Historic Preservation. The Secretary of the Interior's Standards for Archeology and Historic Preservation represent an effort to integrate and systematize the activities of Federal agencies, states, and other entities in preserving the cultural heritage of the United States. The standards and guidelines for their implementation were prepared by the Department of the Interior under the authority of Sections 101 (f), (g), and (h) of the National Historic Preservation Act of 1966, as amended. In addition to the Standards for Rehabilitation described in Section 3.2, they include:

- Standards for Preservation Planning;
- Standards for Identification;
- Standards for Evaluation;
- Standards for Registration;
- Standards for Historical Documentation;
- Standards for Architectural and Engineering Documental ion;
- Standards for Archeological Documentation; and

- o Standards for Historic Presentation Projects.

Each set of standards is accompanied by guidelines for implementation.

C.3.2 Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings. The Secretary of the Interior's Standards for Rehabilitation (36 CFR 67) define "rehabilitation" as "the process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values." The ten standards and the guidelines developed by the National Park Service for administering them are stated in broad terms; however, their application often calls for very specific skills and knowledge. The Standards for Rehabilitation are as follows:

1. Every reasonable effort shall be made to provide a compatible use for a property which requires minimal alteration of the building, structure, *or site* and its environment, or to use a property for its originally intended purpose.

2. The distinguishing original qualities or character of a building, structure, or site and its environment shall not be destroyed. The removal or alteration of any historic material or distinctive architectural features shall be avoided when possible.

3. All buildings, structures, and sites shall be recognized as products of their own time. Alterations that have no historic basis and which seek to create an earlier appearance shall be discouraged.

4. Changes which may have taken place in the course of time are evidence of the history and development of a building, structure, or site and its environment. These changes may have acquired significance in their own right, and this significance shall be recognized and respected.

5. Distinctive stylistic features or examples of skilled craftsmanship which characterize a building, structure, or site shall be treated with sensitivity.

6. Deteriorated architectural features shall be repaired rather than replaced wherever possible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, color, texture, and other visual qualities. Repair or replacement of missing architectural features should be based on accurate duplication of features, substantiated by historic, physical, or pictorial evidence rather than

on conjectural designs or the availability of different architectural elements from other buildings or structures.

7. The surface cleaning of structures shall be undertaken with the gentlest means possible. Sandblasting and other cleaning methods that will damage the historic building materials shall not be undertaken.

8. Every reasonable effort shall be made to protect and preserve archeological resources affected by, or adjacent to any project.

9. Contemporary design for alterations and additions to existing properties shall not be discouraged when such alterations and additions do not destroy significant historic, architectural or cultural material, and such design is compatible with the size, scale, color, material, and character of the property, neighborhood, or environment.

10. Wherever possible, new additions or alterations shall be done in such a manner that if such additions or alterations were removed in the future, the essential form and integrity of the structure would be unimpaired.

The guidelines for applying the Standards were developed in 1979 and revised in 1983. They pertain to historic buildings and structures of all sizes, types, materials, and uses. They apply to both interior and exterior work. They set up a hierarchy for the treatment of old buildings, from the most to the least desirable ways of handling rehabilitation projects, as follows:

1. Identify, retain, and preserve the form and detailing of those architectural materials and features that are important in defining the historic character.

2. Protect and maintain the materials and features that have been identified as important. Protection generally involves the least amount of intervention and may include maintenance measures such as rust removal, caulking, cyclical cleaning of roof gutter systems, or installation of alarm systems or fences.

3. Repair historic materials and features, beginning with the least amount of intervention possible.

4. Replace character-defining features in kind, that is, with the same material whenever possible, or with compatible substitute material when necessary. Replacement should occur only when the feature is too badly deteriorated or damaged to repair.

5. Reproduce missing historic features only if adequate historic, pictorial, and physical documentation exist to

permit accurate reconstruction. Alternatively, replace the missing feature with a new design that is compatible with the remaining character-defining features of the historic building and which takes into account the size, scale and material of the historic building. The new design must be clearly differentiated so that a false historic appearance is not created.

6. Alterations/Additions to historic buildings should not radically change, obscure or destroy character-defining spaces, materials, features, or finishes. Exterior additions should be avoided if possible.

7. Health and safety code requirements and energy retrofitting, while important aspects of rehabilitation projects, are usually not part of the overall process of protecting or repairing character-defining features of a historic building. These types of work are assessed for their potential negative impact on the building's historic character. Therefore, care must be taken not to radically change, obscure, damage, or destroy character-defining materials or features in the process of rehabilitation work to *meet* code *or* energy conservation requirements.

C.4 DOD DIRECTIVES

C.4.1 DODDIR 4710.1, Archeological and Historic Resources Management. This directive provides policy, prescribes procedures, and assigns responsibilities for the management of archeological and historic resources located on land and in waters controlled by DOD.

The purpose is to integrate archeological and historic preservation into planning and management of DOD activities. Of key importance is to minimize expenditures through judicious management within the laws. The Secretary of Defense encourages practical, economically feasible rehabilitation and adaptive reuse of significant historic resources.

C.4.2 OPNAVINST 5090.lA, Environmental and Natural Resources Program Manual, Chapter 2 Historic and Archeological Resources Protection. This instruction sets out policy for the Navy in following the National Historic Preservation Act and the Archeological Resources Protection Act. This instruction conforms to DODDIR 4710.1 which assigns responsibilities for management of historic and archeological resources under DOD control for which NAVFACINST 11010.70 derives its authority. OPNAV's policy states:

> It is Navy policy to integrate the historic and archeological resource protection requirements of applicable laws with the planning and management of activities under Navy control; to minimize expenditures through judicious

consideration of options available in complying with applicable laws; to encourage practical, economically feasible maintenance, rehabilitation and adaptive reuse of National Register resources under Navy control; and to protect significant archeological resources.

C.4.3 NAVFACINST 11010.70, Facility Planning and the Protection of Cultural Resources. This instruction provides amplification of DODDIR 4710.1 and OPNAVINST 5090.lA in providing guidance and responsibilities for protecting cultural resources. The objective outlined is to protect and maintain those resources specified by law, and to cooperate with preservation agencies. A synopsis of responsibilities is provided here for convenience:

NAVFACENGCOM provides the administrative oversight, interagency liaison, and technical review for National Register nominations and forwards materials for the appropriate Navy signatures. NAVFACENGCOM will also review requests for archeological excavations.

The EFD will provide technical advice to activities regarding locating, inventorying, nominating, maintaining, and contracting for interagency consultation and documentation of cultural resources. The EFD will maintain the 'property records for significant resources listed by DOI on forms DOI 10-306. EFD's will also liaison with SHPOs and with regional offices of the NPS and the ACHP. The EFD will assist NAVFACENGCOM in interagency liaison.

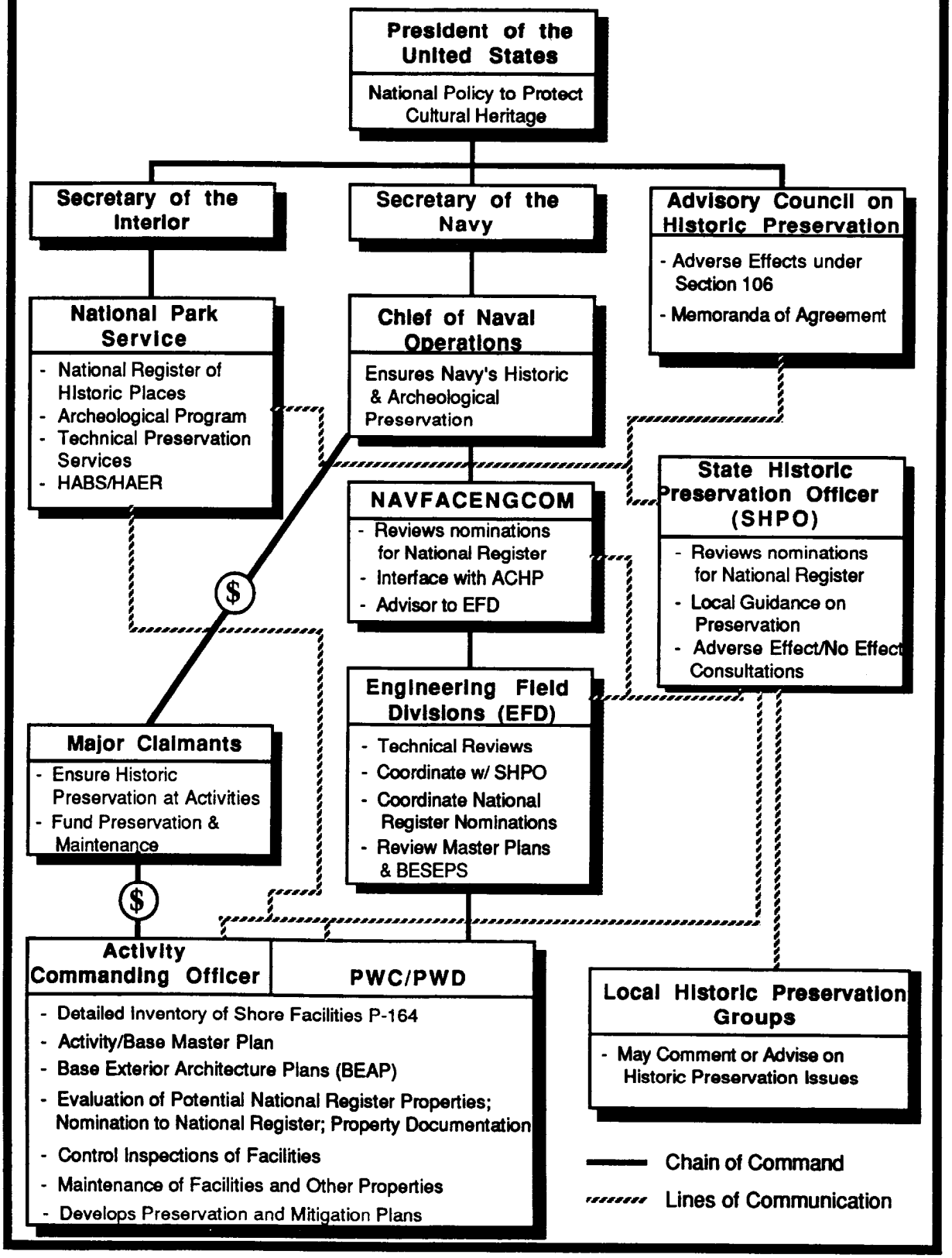
Activity Commanding Officers should contact their EFD's for technical consultation, establishing priorities for inventories and handling of cultural resources, contracting for needed expertise, and handling emergencies such as discoveries during construction, demolition, or storm cleanup.

C.4.4 US ARMY TM 5-801-1, Historic Preservation Administrative Procedures (NOV 1975). The Army's equivalent to the administrative guidance contained in this manual. This manual outlines the policies and procedures to manage, maintain, and nominate facilities through the Army's chain of command. The companion manual, TM 5-801-2, addresses technical and maintenance information for historic preservation.

C.4.5 US ARMY TM 5-801-2. Historic Preservation Maintenance Procedures (FEB 1977). This manual would be most helpful for public works organization dealing with maintenance program considerations. Topics discussed are: structural, water problems, roofs and flashing systems, cleaning and coating, masonry decay, fenestration and openings, hardware and miscellaneous metals, building regulations, emergency measures, mothballing, special materials, substitute items, and mechanical equipments.

This manual has an extensive bibliography for additional literature.

APPENDIX D
HISTORIC PRESERVATION RESPONSIBILITIES



NPS Form 10-900
(Rev. 8-86)

OMB No. 1024-0018

United States Department of the interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations of eligibility for individual properties or districts. Sea instructions in *Guidelines for Completing National Register Forms* (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property

historic name

other names/site number

2. Location

street & number ❑ not for publication

city, town ❑ vicinity

state code county code zip code

3. Classification

Ownership of Property	Category of Property	Number of Resources within Property	
		Contributing	Noncontributing
❑ private	❑ building(s)		buildings
❑ public-local	❑ district		sites
❑ public-State	❑ site		structures
❑ public-Federal	❑ structure		objects
	❑ object		Total

Name of related multiple property listing:

Number of contributing resources previously listed in the National Register

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this ❑ nomination ❑ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60, In my opinion, the property ❑ meets ❑ does not meet the National Register criteria. ❑ See continuation sheet.

Signature of certifying official Date

State or Federal agency and bureau

In my opinion, the property ❑ meets ❑ does not meet the National Register criteria. ❑ See continuation sheet.

Signature of commenting or other official Date

State or Federal agency and bureau

5. National Park Service Certification

I, hereby, certify that this property is:

❑ entered in the National Register.
❑ See continuation sheet.

❑ etermined eligible for the National Register. ❑ See continuation sheet.

❑ etermined not eligible for the National Register.

❑ removed from the National Register.

❑ other, (explain:).

Signature of the Keeper Date of Action

6, Function or Use

Historic Functions (enter categories from instructions)

Current Functions (enter categories from instructions)

7. Description

Architectural Classification
(enter categories from instructions)

Materials (enter categories from instructions)

foundation

walls

roof

other

Describe present and historic physical appearance.

❑ See continuation sheet

8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties:
❑ nationally ❑ statewide ❑ locally

Applicable National Register Criteria ❑ A ❑ B ❑ C ❑ D

Criteria considerations (Exceptions) ❑ A ❑ B ❑ **C** ❑ D ❑ E ❑ F ❑ G

Areas of Significance (enter categories from instructions)

Period of Significance

Significant Dates

Cultural Affiliation

Significant Person

Architect/Builder

State significance of properly, and justify criteria, criteria considerations, and areas and periods of significance noted above.

❑ See continuation sheet

9. Major Bibliographical References

❑ See continuation sheet

Previous documentation on file (NPS):

❑ preliminary determination of individual listing (36 CFR 67) has been requested
❑ previously listed in the National Register
❑ previously determined eligible by the National Register
❑ esignated a National Historic Landmark
❑ recorded by Historic American Buildings Survey # _____
❑ recorded by Historic American Engineering Record # _____

Primary location of additional data

❑ State historic preservation office
❑ Other State agency
❑ Federal agency
❑ Local government
❑ University
❑ Other

Specify repository: _____

10. Geographical Data

Acreage of property _____

UTM References

	Zone	Easting	Northing
A			
B			
C			
D			

❑ * continuation sheet

Verbal Boundary Description

❑ See continuation sheet

Boundary Justification

❑ See continuation sheet

11. Form Prepared By

name/title _____
organization _____ date _____
street & number _____ telephone _____
city or town _____ state _____ zip code _____

APPENDIX E
POINTS OF CONTACT

Naval Facilities Engineering Command
Code 20YJM Special Advisors for Planning Coordination
AV 221-7353 COM (703) 325-7353

Northern Division
Naval Facilities Engineering Command
AV 443-6270 COM (215) 897-6270

Chesapeake Division
Naval Facilities Engineering Command
Code 20 Installation Planning Division
AV 288-3387 COM (202) 433-3387

Atlantic Division
Naval Facilities Engineering Command
AV 564-2300 COM (804) 445-2300

Western Division
Naval Facilities Engineering Command
AV 494-3719 COM (415) 244-3719

Southwest Division
Naval Facilities Engineering Command
AV 522-2931 COM (619) 532-2931

Southern Division
Naval Facilities Engineering Command
AV 563-0781 COM (803) 743-0781

Pacific Division
Naval Facilities Engineering Command
COM (808) 471-3926

Advisory Council on Historic Preservation
1100 Pennsylvania Avenue NW
Washington, DC 20006
(202) 786-0503

National Register of Historic Places
U.S. Department of the Interior
Washington, DC 20240
(202) 343-9536

Western Division
Advisory Council on Historic Preservation
730 Simms Street, Suite 401
Golden, CO 80401
(303) 231-5320

NATIONAL PARK SERVICE REGIONAL OFFICES

AND THE STATES THEY SERVE

Preservation Assistance Division
National Park Service
P.O. Box 37127
Washington, DC 20013-7127

National Capital Regional Office
National Park Service
1100 Ohio Drive SW
Washington, DC 20242
(202) 485-9813

National Historic Preservation Programs
Western Regional Office
National Park Service
450 Golden Gate Ave
Box 36063
San Francisco, CA 94102
(415) 556-4196

California, Arizona, Nevada, Hawaii, Guam, Commonwealth of Northern Marianas Island, American Samoa, Federated States of Micronesia, Republic of the Marshall Islands, Republic of Palau

Division of Cultural Resources
Rocky Mountain Regional Office
National Park Service
12795 West Alameda Parkway
P.O. Box 25287
Denver, CO 80225
(303) 969-2875

Montana, North Dakota, South Dakota, Wyoming, Utah, Colorado

Preservation Services Division
Southeast Regional Office
National Park Service
75 Spring St. SW., Room
1140 Atlanta, GA 30303
(404) 331-5185

Mississippi, Tennessee, Alabama, Georgia, Florida, South Carolina, Kentucky, Virgin Islands, Commonwealth of Puerto Rico

Office of Cultural Programs
Mid-Atlantic Regional Office
National Park Service
Second and Chestnut Sts.
Philadelphia, PA 19106
(215) 597-2284

Pennsylvania, Virginia, West Virginia, Delaware, Maryland

Cultural Resources Division
Alaska Regional Office
National Park Service
2525 Gambell St., Room 107
Anchorage, AK 99503
(907) 261-2690

Alaska

Midwest Regional Office
National Park Service
1709 Jackson St
Omaha, NE 68102
(402) 221-3431

Nebraska, Missouri, Kansas, Iowa, Illinois, Indiana, Wisconsin, Michigan, Minnesota, Ohio

North Atlantic Regional Office
National Park Service
15 State St
Boston, MA 02109-3572
(617) 565-8841

New York, New Jersey, Connecticut, Rhode Island, Massachusetts, New Hampshire, Vermont, Maine

Southwest Regional Office
National Park Service
P.O. Box 728
Santa Fe, NM 87504-0728
(505) 988-6388

New Mexico, Texas, Louisiana, Oklahoma, Arkansas

STATE HISTORIC PRESERVATION OFFICERS

ALABAMA
SHPO
Executive Director,
Alabama Historical Commission,
725 Mentor Street
Montgomery, AL 36130
(205) 261-3184

ALASKA
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Division of Parks
Office of History and Archeology
P.O. Box 107001
Anchorage, AK 99510-7001
(907) 762-2622

AMERICAN SAMOA
HPO
Department of Parks and Recreation
Government of American Samoa
Pago Pago, American Samoa 96799
(684) 699-9614/9513

ARIZONA
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800 West Washington
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Phoenix, AZ 85007
(602) 542-4009

ARKANSAS
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Arkansas Historic Preservation Program
Suite 200
The Heritage Center
225 E. Markhan
Little Rock, AR 72201
(501) 371-2763

CALIFORNIA
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Office of Historic Preservation
Department of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94296-0001
(916) 445-8006

COLORADO
SHPO
President
Colorado Historical Society
1300 Broadway
Denver, CO 80203
(303) 866-2136

CONNECTICUT	**SHPO** **Director** **Connecticut Historical Commission** **59 So. Prospect Street** **Hartford, CT 06106** **(203) 566-3005**
DELAWARE	**SHPO** **Director** **Division of Historical and Cultural Affairs** **Hall of Records** **Dover, DE 19901** **(302) 736-5313**
DISTRICT OF COLUMBIA	**SHPO** **City Administrator** **1350 Pennsylvania Ave. N.W.** **District Building** **Washington, DC 20004** **(202) 727-6365**
FLORIDA	**SHPO** **Director** **Division of Historical Resources** **Department of State** **R. A. Gray Building** **500 S. Bronaugh St.** **Tallahassee, FL 32399-0250** **(904) 488-1480**
GEORGIA	**SHPO** **Commissioner** **Department of Natural Resources** **205 Butler St. S.E.** **1462 Floyd Towers East** **Atlanta, GA 30334** **(404) 656-2840**
GUAM	**SHPO** **Director** **Department of Parks and Recreation** **490 Naval Hospital Road** **Agana Heights, Guam 96910** **477-9620 ext 4 Overseas Operator**
HAWAII	**SHPO** **Chairperson** **Department of Land and Natural Resources** **P.O. Box 621** **Honolulu, HI 96809** **(808) 548-6550**

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Boise, ID 83702
(208) 344-3890

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Old State Capitol
Springfield, IL 62701
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Department of Natural Resources
608 State Office Building
Indianapolis, IN 46204
(317) 232-1646

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State Historical Society of Iowa
Capitol Complex
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Des Moines, IA 50319
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120 West Tenth
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Kentucky Heritage Council
12th Floor
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Frankfort, KY 40601
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LOUISIANA

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Office of Cultural Development
Department of Culture, Recreation and Tourism
P.O. Box 44247
Baton Rouge, LA 70804
(504) 342-8200

MAINE	**SHPO** **Director** **Maine Historic Preservation Commission** **55 Capitol Street** **Station 65** **Augusta, ME 04333** **(207) 289-1232**
REPUBLIC OF THE MARSHALL ISLANDS	**HPO** **Secretary of Interior and Outer Islands Affairs** **Alele Museum** **Box #629** **Majuro, Republic of the Marshall Islands 96960**
MARYLAND	**SHPO** **Director of Historical and Cultural Programs** **Department of Housing and Community Development** **45 Calvert St.** **Annapolis, MD 21401** **(301) 974-2150**
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FEDERATED STATES OF MICRONESIA	**FSM HPO** **Office of Administrative Services** **Division of Archives and Historic Preservation** **FSM National Government** **P.O. Box 490** **Kolonia, Pohnpei 96941** **Telex 729-6808**
MINNESOTA	**SHPO** **Director** **Minnesota Historical Society** **690 Cedar Street** **St. Paul, MN 55101** **(612) 296-2747**

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Department of Environmental Protection
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