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Twenty-Eight Coats of White House History

James I. McDaniel

White House, east elevation with scaffolding, after paint removal.

How does one approach the problem of repainting the White House? Because the White House is a memorial to our historic past as well as a functional structure for conducting business, the process is more complex than the yearly maintenance of an urban office building. Nevertheless, the procedure followed for the White House offers an interesting correlation for other historic buildings.

In recent years, the exterior of the White House has been painted on a four-year cycle. But the amount of intervening touch-up has been steadily increasing. The failure of new paint to adhere to an aged, multi-layered base led to a 1976 National Park Service decision to contract with the National Bureau of Standards (NBS) for a comprehensive study of exterior coating performance at the White House. The Park Service closely coordinated

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Historic Structures of the National Park Service

Travis C. McDonald, Jr.

The most comprehensive collection of American architecture under single ownership is that which belongs to the American people under the stewardship of the National Park Service. The extent of its comprehensiveness, in fact, makes even this concise history a painful, if not impossible task to perform in the space allotted. The brevity of this article then dictates its scope. The intention in offering a smattering of stylistic examples identified in a broad context is to generate an appreciation of such a diverse group of structures. Not all conceivable building types or styles can be discussed. Inclusion of specific examples does not imply their superiority any more than exclusion implies inferiority, but rather, examples were chosen for their characteristic qualities.

Unfortunately, this article will necessarily be divorced from the usual accompanying discussion of architecture's sister arts: painting, sculpture, and furnishings. One further disclaimer must be made. Generally, architecture is designated historic for one or both of two reasons. Either it is singled out for the historic persons or events with which it is associated, or it exemplifies an architectural quality in and of itself. The widely recognized historic structures found in the historic areas of the Park System (outnumbering natural areas two to one) were designated as such to "commemorate persons, events, and activities important in the Nation's past." Many natural and recreational areas also contain historic structures that were usually acquired with the property. In order to include these "non-historically associated" structures in the development of this article, the context will be that of the development of American architecture as a building art, excluding specific historic events.

American architecture and building nautrally begin with Native Americans. By AD 1000, America's prehistoric hunters and gatherers had established distinctive cultures adapted to varied climatic regions. Evidence of the Eastern Woodland Culture (BC 1000 to AD 1000) still exists in the form of earthen mounds. These mounds were hand constructed and were generally geometric in plan, serving the function of defense, burial, or as effigies. Examples are found at Effigy Mounds National Monument, Iowa; Mound City Group National Monument, Ohio; and Ocmulgee National Monument, Georgia. The tribes settling the west, reacting to a different climate, developed their own building forms. The Anasazi culture, for example, developed a pueblo building technology consisting

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of mud bricks, adobe plaster and cedar logs. Examples include the Cliff Palace (ca. AD 1100) at Mesa Verde National Park, Colorado; Casa Blanca (11th century) at Canyon de Chelly National Monument, Arizona; Pueblo Bonito (ca. AD 920) at Chaco Canyon National Monument, New Mexico; and the massive, four-story building (14th century) at Casa Grande National Monument, Arizona.

Sixteenth- and seventeenth-century America was the scene of legendary European rivalry for territory in the New World. The main contestants, Spain, England, and France, competed for footholds in the American wilderness, which along with Native Americans, became their common denominator. It was only natural that the Europeans who came, whether for political, religious, military, or personal reasons, transported Old World building forms with them. The history of American architecture from this point onward is one of adaptation and change; a variety of reasons necessitated that the transplanted European architecture slowly become Americanized. The buildings constructed by the English colonists along the Atlantic seaboard during the seventeenth century can best be labeled medieval survival. Drawing on English architecture from the sixteenth and seventeenth centuries, the colonists were forced by the harsh extremes of the New World climate to develop two basic types of houses: northern and southern. Both were characterized by steeply pitched gable roofs; small panes of glass in leaded casements; protective exterior sheathing on frame houses; and little or no decorative architectural features.

In the northern areas, heavy-timbered houses were usually constructed around a massive central chimney in order to conserve heat. The wall filling between timbers consisted of brick nogging or waddle-and-daub and was covered on the exterior by clapboards for protection against the weather. If two story, the northern houses had a second-story overhang. The Paul Revere House, ca. 1676, in Boston is a good example of a New England house from the seventeenth century. The typical southern house was one and one-half stories with dormer windows and two gable-end chimneys. The kitchen chimney was usually on the exterior of the wall due to the excessive summer heat. Similarly, the houses were usually only one room deep for ventilation purposes.

The architecture transported to America by the Spanish and French was adapted to a greater degree. Spanish missionaries in the Southwest had to rely on Indian labor and building technology in early mission churches in the New Mexico area, resulting in a combination of European and Indian forms. On the other hand, a lack of skilled Indian labor in Texas and Arizona led to imported Spanish artisans who created missions that were conceptually and technically much more European, even if provincial. An example of Spanish Baroque architecture is the mission church (1691) at Tumacacori National Monument, Arizona.

Cliff Palace, Mesa Verde NP.

San Jose Mission, San Antonio Missions NHP.

The transplanted French colonial forms in America were distinct, yet not really French. The French traders largely established themselves in the Mississippi Valley, and built timber frame houses with overhanging roofs supported on a post-on-sill construction, creating a gallery or porch on one or more sides. This form is thought to have originated in the Carribean region. The reconstructed Great Hall at Grand Portage National Monument, Minnesota, and the original section of the Ranch House at Montana's Grant-Kohrs Ranch National Historic Site are examples of this house form.

With the turn of a new century in 1700, the advent of a new style, the Georgian, swept through the English colonies, lasting approximately eighty years. This style was the result of seventheenth- and eighteenth-century English architecture which had been influenced by the architecture of the Italian Renaissance. The principal English influences on America were Sir Christopher Wren and James Gibbs, Wren having been the earlier influence. The prevalence of such an "academic" style was due to the availability of architectural handbooks used by gentleman architects. Georgian characteristics include symmetry, axiality, geometric proportions, classical details, projecting entrance pavilions, Palladian window, sash windows, and usually a hipped roof. Later Georgian buildings also featured giant pilasters, corner quoins, roof balustrades, and compositions using connected dependencies. Compared to its English models, the American Georgian was provincial in its scale and lavishness. Domestic and public examples include Hampton Mansion (1783-90), Maryland; the Longfellow House (1759), Massachusetts; the Nelson House (ca. 1711), Yorktown, Virginia; and the complex of buildings at Independence National Historical Park, Philadelphia. Georgian church design was also derived from Wren and Gibbs, such as the Old South Meeting House (172930); the Old North Church, 1723-40, both in Boston; and the Touro Synagogue (1759-63), Newport.

Architectural styles are never discontinued at any precise moment. The Revolutionary War provides a convenient end point for the Georgian period, but it continued to be used into the nineteenth century by builders who knew nothing else. New styles begin as slowly as the previous ones end, usually through decorative arts or by the application of new decorative architectural features to an earlier house form. Despite the American Revolution, England remained the fountainhead of architectural style. The new Federal style (named after the new nation) was popular from about 1780 to 1820, and was adapted from the Adamesque style in England. The Adam brothers had created a new style in the second-half of the eighteenth century by observing Roman architecture firsthand and by freely adapting those forms and elements. The

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Interior Finishes of NPS Buildings, Special Segment of America's Decorative Arts Heritage

Andrea M. Gilmore

Located from Sitka, Alaska to St. Augustine, Florida, the structures owned by the National Park Service represent the stylistic, geographical, and functional variations found in America's rich architectural heritage. Crisscrossing the country, a sample of NPS buildings includes: a cattle ranch in Deer Lodge, Montana; a Spanish mission in Tumacacori, Arizona; a Revolutionary War period tavern in Lincoln, Massachusetts, Ellis Island in New York, New York, the Maggie Walker House in Richmond, Virginia and a Spanish fort in St. Augustine, Florida. The interior finishes of this diverse collection (their painted finishes, wallpaper, and wood and plaster moldings) form a specialized segment of our decorative arts tradition. Many of these finishes, such as grained woodwork or block printed wallpaper, were handmade by highly skilled artisans. Other finishes, such as Lincrusta Walton or pressed metal ceilings, are early machine-produced surface coverings. As decorative arts, these finishes have two primary characteristics -- first, they are a type of art object, and second, they are integral parts of the structure in which they are found. This dual character poses complex philosophical and technical problems which must be resolved for their maintenance, preservation, and restoration. A cursory tour of a selected sample of NPS buildings reveals the wealth of this decorative arts heritage, as well as some of the problems encountered in the management of this collection.

Dining Room of Ranch House, Grant-Kohrs Ranch NHS.

Plaster Wall Paintings

There were two primary types of plaster wall paintings in the 18th and 19th centuries -- freehand and stenciled. Freehand wall decoration was produced by brush with no standard pattern for the design. Stenciled wall paintings were produced by painting patterns cut out of heavy paper. Each color and shape was produced by a separate stencil.

At the Tumacacori National Monument, the interior walls of the mission church sanctuary are stenciled with provincial Baroque and Neo-classical designs. The church was built between 1790 and 1827; the paintings date from the later years of this building campaign. The wall finish is made up of two coats of lime plaster, applied directly to the adobe and firebrick walls. A limewash was applied over the finish plaster. Onto this wash, the design was stenciled. The paints used were composed of mineral pigments in an aqueous solution.

In 1975, Anthony Crosby, Historical Architect for the Denver Service Center began to study how to conserve the Tumacacori paintings. A comprehensive monitoring system was set up to study two primary problems -- flaking occurring to the painted decorations in the dome, and the instability of the plaster substrate. The monitoring indicated that the flaking of the paint was caused by efflorescence and subflorescence, creating stress in the paint that resulted in the flaking. The source of the salts turned out to be earth fill used in supporting the base of the dome. Cracked exterior stucco cement allowed water to penetrate this fill, which contained nitrate salts, and caused the salts to migrate. In 1978, the earth fill was removed and replaced with low-fired bricks set in a lime mortar. The cracked cement stucco was removed and replaced with a lime-sand mortar. These two measures have reduced significantly the efflorescence occurring in the dome.

The unstable plaster resulted from the breakdown of the bond between the plaster and the adobe walls. It had been caused by rainwater eroding the plaster keys. The mechanical bond between the plaster and the walls has been sheared by differential movement between the plaster face and the abode walls. Since the primary cause of this deterioration, eroding rain water, had been eliminated when re-roofing the church, methods for repairing the plaster and adobe bond were studied. Flexible epoxy pins appear to be the most promising method, but further study of the problem is planned. Future conservation at Tumacacori will be coordinated with the cyclical maintenance program for the site.

Another interesting example of hand-painted wall decoration is found at Lindenwald, Martin Van Buren's home in Kinderhook, New York. These wall paintings recently have been studied and documented by Margaret Coffin, a consultant to the NPS. The wall paintings found in the c. 1797 portion of the house are located in the main entrance hall, the dining room, the second floor hall, and in a large, second floor room that may have been the ballroom. These decorations represent the first finish on the plaster walls.

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The Lindenwald decorations are painted freehand, rather than stenciled. In all rooms except the dining room, the paintings are used as borders; in the dining room, they cover the area of the wall above the chair rail. The designs consist primarily of swags and bunches of fruit and flowers. The exception is the large, second-floor room which has a border with a draped rope motif. The principal colors used for the wall paintings are green, red, and white.

Unlike the wall paintings at Tumacacori, the wall paintings at Lindenwald have never been exposed to the elements and do not suffer from an unstable plaster substrate or excessive moisture. However, they pose another difficult documentary and conservation problem: they have been painted over, except

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this study with Chief Usher Rex Scouten who represents the First Family in all matters dealing with the residence.

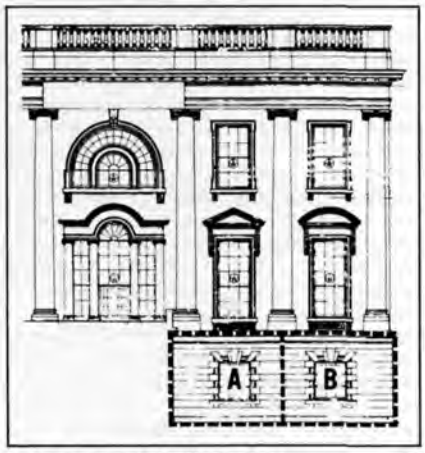
Research began with a review of historical documents on paint and exterior maintenance. The NBS concluded there were too many coats on the White House walls to work with. Paint chips in some areas measured 1/4-inch (1.9 cm) thick.

Extensive field and laboratory testing on paint removal techniques, sandstone restoration, and modern coating systems was run by NBS over the next two years. One thousand square feet (92 sq. meters) of White House exterior was set aside for a long-term (1 1/2-year) field test of four paint removal techniques and four coating systems -- the finalists from many tested in the laboratory. A grid system was laid out on the test area to allow each coating to be applied over each cleaning method.

Paint removal methods used in the field test included: 1) combination hand cleaning, chemical treatment, and water spray; 2) chemical treatment/ water spray; 3) abrasive blasting with aluminum beads; and 4) hand scraping and chipping. The chemical/water spray method was by far the most successful. Coating materials applied after the test cleanings were as follows: 1) latex (acrylic); 2) styrene-butadiene (rubber-based); 3) vinyl toluene-acrylate (textured coating); and 4) tung oil-alkyd.

The test area was then monitored 14 months, using sophisticated instruments to measure color difference, adhesion and other characteristics. Laboratory tests were conducted simultaneously to complement the field study. One of the more interesting laboratory experiments involved use of the Chamber for Accelerated Decay (CAD). Developed by the Illinois Institute of Technology Research, the CAD enabled scientists to combine several factors affecting stone decay and coating deterioration in one test cycle. CAD tests for the White House subjected coated sandstone specimens to chemical attack, salt and water action, thermal effects and freeze/thaw action. Through this procedure, several years of weathering could be simulated in a few weeks. Additional scientific tests conducted by the NBS included water absorption measurements, water vapor permeation measurements, exposure to ultraviolet radiation, and exposure to water condensation.

By the end of 1979, NBS scientists were ready to make some firm recommendations to the Chief Usher and the NPS: 1) that all paint on the east elevation be removed down to bare stone, using the chemical/ water spray method -- the project was phased starting with the east elevation to create the least visual impact and the least disruption of tours, ceremonies and other official business; 2) that the sandstone be repainted with a linseed oil, tung oil, soya alkyd paint, using 2 coats over bare stone, and one coat over previously painted surfaces; 3) that the results be closely monitored to evaluate the effectiveness of the restoration procedures and to refine the specifications for subsequent restoration of the remainder of the historic structure.



White House, east elevation test area.

A contract to perform the restoration work was awarded to RUDCO, a building cleaning firm in Hartford, Connecticut. The final specifications called for: 1) complete removal of all paint from the east elevation of the White House; removal of only loose paint and other loose foreign material from the north, west, and south elevations; 2) repair, repointing, and, if needed, replacement of deteriorated masonry; and 3) repainting with a prime coat and finish coat on exposed masonry surfaces, and with only a finish coat on previously painted surfaces. Based on test results, the paint selected for use was a linseed oil, tung oil, soya alkyd coating.

Work actually began on the White House in August, 1980. Extensive precautions

(Left) 1865 photograph of bedroom where Lincoln died. Petersen House, Ford's Theatre NHS.

1980 photograph showing restoration of bedroom in Petersen House.

in the first floor entry hall where they were covered with wallpaper. Revealing the full detail of these paintings was the objective of Ms. Coffin's study. This was accomplished by "rubbing" with paper and charcoal the raised relief of the paintings to get their approximate outlines. The full details and colors of the paintings were then uncovered by sanding away the layers of more recent paint. Sanding was done by hand with a very fine weight of sand paper.

Restoration of these wall paintings, with the exception of limited areas in the main entrance hall, would have involved nearly complete repainting. However, Lindenwald is being restored to the Van Buren residency, when, as correspondence clearly indicates, the walls in all the rooms containing freehand wall paintings were covered with wallpaper. Once interior restoration is complete in 1982, these wall paintings will be covered again; therefore, documentation during restoration is required. Precautions will be taken when hanging new and conserved wallpapers to minimize damage to the freehand paintings.

Grained Woodwork

Graining is a method of painting a surface, usually an inexpensive softwood, to imitate more fashionable, costly woods, such as cedar, mahogany, or oak. A grained surface consists of several layers of undercoat and several layers of glaze in which the graining pattern is created.

When restoration work began at Longfellow House in Cambridge, Massachusetts in 1975, grained finishes in the kitchen, laundry room, pantry, and first floor back hall were identified for restoration. These rooms are secondary spaces in the Georgian mansion, home of the poet Henry Wadsworth Long-

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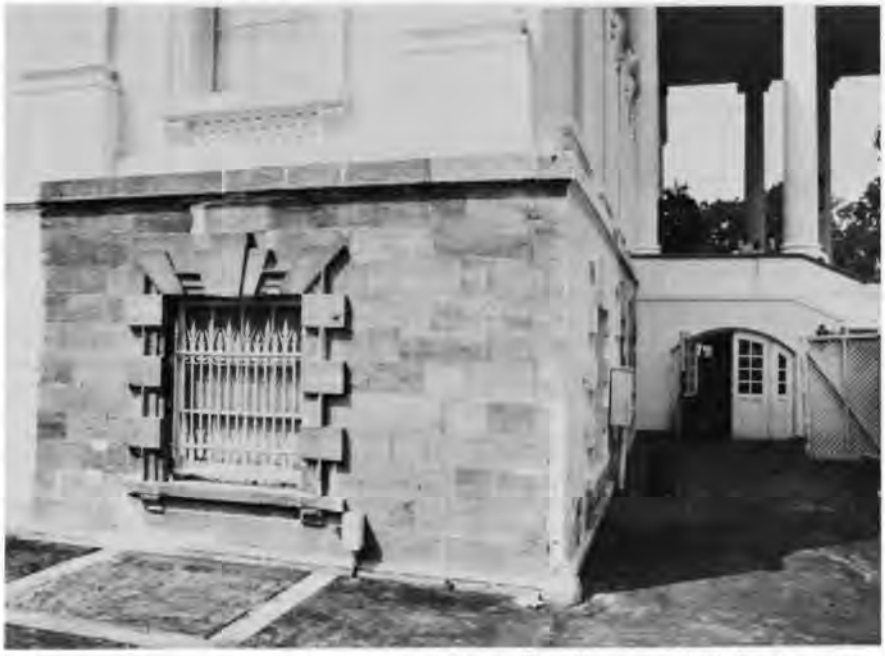

Test area B (see diagram to the left) after paint removal.

were taken to protect the structure and surrounding landscape. All liquid effluent from the chemical/water spray removal process was collected by wet vacuum and pumped into 55-gallon (209 liter) drums for transport from the site. Windows were protected from accidental damage by fitting solid covers over them during paint removal operations. And plastic hand scrapers replaced the normal wire brush tools to reduce the potential for gouging the soft sandstone.

The paint removal process proved to be difficult, because of the multilayered build-up of different types of coatings. The original base coat was the toughest to remove. RUDCO found it necessary to alter the chemical formulations of the removers at least three times as they worked their way through the 28 layers of paint. Once the paint was removed, the entire elevation was rinsed with a mild solution of acetic acid to balance the alkalinity of the paint removers and ensure a neutral pH. Work was suspended during the winter to allow caulking and mortar repairs extra time to cure, and to allow the all-important primer coat of paint to be applied under ideal weather conditions this spring.

The National Park Service, using a grant from the Heritage Conservation and Recreation Service, also arranged for photogrammetical documentation of the east elevation of the White House. This work is being done while the stone is exposed and will provide scale drawings in three dimensions of the window ornamentation and other fine architectural details. These drawings will form a permanent record of the existing conditions.

What is the next step? As of this writing, plans are being made for the completion of the east elevation painting in May, 1981. The National Bureau of Standards has agreed to continue monitoring the results of this restoration work and to update the specifications, if needed. The NPS and the Chief Usher are programming funds in the budget cycle to complete the restoration of the north, west, and south elevations in the future. And the NPS is considering development of a preservation maintenance manual for use at the White House by managers, architects, engineers, technicians and craftsmen. The White House Liaison Office of the NPS would be pleased to answer any inquiries on this project and to provide copies of the NBS Report and Guide Specifications. Please write to: Executive Assistant, White House Liaison, NPS, 1100 Ohio Drive, SW, Washington, DC 20242.

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Historic Preservation Training for NPS Personnel

James S. Askins

The concepts for what eventually turned out to be the Williamsport Preservation Training Program can probably be traced to many sources. Most directly, a meeting conducted in Santa Fe, New Mexico (Fall 1976) congealed National Park Service thoughts on the issue of preservation training for NPS personnel. NPS leaders attending this meeting pinpointed the Service's most pressing need as a more fully trained work force better able to care for the historic structures under its jurisdiction.

History

The outcome of this recommendation was a visit by Denver Service Center Associate Manager Don Bressler (Spring 1977) to Williamsport, Maryland along the C&O Canal. He developed a position paper, outlining recommendations for training professionals and craftsmen in the field of historic preservation.

The position paper identified the training goals, numbers and types of positions involved, qualifications for applicants, estimated training costs, and training site location. This paper has since provided the general direction for the development and operation of the training center.

If used to direct a training program, the goals identified in Don Bressler's paper appeared to be practical aims for a historic preservationist working on NPS properties. These goals assured compliance with the laws, regulations, and policies dictating the work performance level for preservation projects. They fell into seven broad categories: 1) legislative compliance, 2) architectural investigation and recording of historic structures, 3) a good working knowledge of period architectural design and craftsmanship, 4) design limits and use of traditional and modern building materials, 5) research, advanced planning, comprehensive design and project planning, 6) construction project supervision and contract administration, and 7) government procurement and personnel regulations. The decision was made to structure training in these categories around the individual needs of each intake trainee. The skills, knowledge, ability, and previous training each person brought into the program determined the exact organization of that trainee's individual instruction.

The program established applicant entrance levels for building trades mechanics who had completed a recognized four-year apprenticeship program, with a minimal two years' experience as a journeyman in one of the construction trades. A degree in one of the professions, such as architecture, engineering, or landscape architecture could compensate for on-the-job experience.

Location

A home for the training center was selected in Williamsport, Maryland. The reasons for locating the center at Williamsport were manyfold. First of all, Williamsport was near the halfway mark for the 184.5-mile C&O Canal National Historic Park. A team of professionals known as the C&O Canal Restoration Team (Denver Service Center) had been performing a variety of historic preservation duties on-site since the fall of 1973. Their operation offered a special training opportunity for the Williamsport Center. The team initiated between 12 and 17 diverse projects each year. This offered intake trainees on-the-job experiences not available elsewhere in the NPS. Secondly, it appeared the C&O Canal team would remain on assignment at the Park for some time. And, finally, available at Williamsport were two large unoccupied historic structures acquired by the Park as part of its land acquisition program. The Park made these available to the training program in order to house its operations.

Participants and Training Projects

In November, 1977, the first intake trainee, John Marsh (Architect) entered the program, followed by three craftsmen in early 1978. These were Robert Hartman (brick mason), Charles "Jerry" Shaffer (stone mason), and Mike Lee (carpenter). In January, 1979, the fifth intake trainee, Francis Lucas (carpenter) from Independence National Historical Park, joined the program. The first four interns have since completed their training assignments and have been reassigned.

With an initial enrollment of four students, the program board involved themselves in the task of preparing an Individual Development Plan for each intake trainee. Each student's IDP outlined an individualized three-year training program based on that student's skills background. Since each trainee came with a variety of skills, knowledge, and educational backgrounds, the task of integrating these factors and fitting the curriculum to the student became a detailed, involved process. Since the training program was sponsored by the

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fellow. Over the years, the graining had been damaged by water, abrasion, and over-graining. Detailed examination of the grained surfaces indicated that restoration would require regraining, overgraining, and ingraining.

Areas that were overgrained received only a light coat of glaze. Areas that were regrained received an undercoat of low-luster enamel paint, tinted to match the later glaze layers. Two or three layers of undercoating were applied. Next, two to three layers of glaze were applied in which original knots and grain patterns were copied from drawings made from the original graining. Grain patterns were made with whisk brooms, cheese cloth, combs and rubber graining stamps. After the glaze was grained on, several additional coats of glaze were applied. Ingrained areas were filled by the same steps followed in regraining. Artist's brushes rather than paint brushes were used for paint application.

Graining is not a lost craft, but one that only a few painters practice. Faced with this fact, NPS decided to train a grainer to do the work at the Longfellow House. This solution, to train a craftsman, is one that is necessary as the demand for high quality restoration work increases. Under the direction of Gene Goldsmith, Preservation Specialist for the North Atlantic Historic Preservation Center, a member of the restoration crew, Mark Hirschfeld, was trained to restore the grained woodwork.

Two other good examples of unrestored grained woodwork are found at the Captain Edward Penniman House in the Cape Cod National Seashore and at Ferry Hill in the C&O Canal National Historic Park.

Wallpaper

During the 19th century, the most popular finishing for plaster walls was wallpaper. As a consequence, the preservation of NPS buildings frequently involves the documentation, conservation, and restoration of historic wallpapers.

At the Grant-Kohrs Ranch in Deer Lodge, Montana, Rodd Wheaton, Regional Historical Architect for the Rocky Mountain Region, has been researching the wallpapers in the dining room and the Beilenberg bedroom for restoration. The ranch house is being restored to its turn-of-the-century appearance, when it was the home of John Kohrs, a baron of the open range cattle industry, and his wife, Augusta.

Records indicate that most of the furnishings for the house were purchased in Chicago. It seems probable that the wallpaper was acquired there as well. The original portion of the house, a two-story log structure built in 1866 houses the Beilenberg bedroom. This room was decorated in 1890. In the Beilenberg bedroom, the early wallpaper has been found under later layers of wallpaper. It consists of a ceiling, cornice and above-the-dado wallpaper, all is shades of green. The media of the early wallpapers is water soluble, as is the paste of the later wallpapers, making uncovering it infeasible. Therefore, the papers will be reproduced.

In the dining room, which is located in a large brick wing of the house, all physical evidence of the restoration wallpaper has been destroyed. The only documentation for the wall finishes is a photograph of the room taken about 1900. In the photograph, the finishes have been identified as follows: ceiling, white paper or paint; cornice, cardboard cove with a gilded freize paper; walls above dado, arsenic green, embossed ingrain paper or an oatmeal paper. The dado consists of golden oak panels.

Restoration of the cornice will be based on its design as revealed in the photograph. Restoration of the wallpaper above the dado presents a more difficult problem, since its surface characteristics are obscure. The type of paper was narrowed to an oatmeal paper or an ingrain paper. Oatmeal papers are impossible to obtain. The color of oatmeal paper is produced by dying the individual paper fibers, rather than by a printing process. Ingrain wallpaper is also difficult to obtain. Therefore, the restoration proposal for this room calls for the scenic c. 1940 wallpaper presently on the walls to be painted an arsenic green color, so as to produce a similar wall finish.

At the Petersen House in Washington, DC, the house where Lincoln died, a similar wallpaper reproduction problem has been resolved by Gary Scott, Architectural Historian for the National Capital Region. Petersen House, a simple brick rowhouse built in 1849 and used as a boarding house, was the site where Abraham Lincoln was taken after being shot at Ford's Theater. Lincoln died in a small back bedroom, and it was for this room that a wallpaper was reproduced.

As with the dining room at Grant-Kohrs, no physical evidence of the wallpaper remained. The only documentation for the wallpaper consisted of two newspaper wood engravings, a newspaper artist's rough sketch, and a photograph. The newspaper wood engravings appeared in Harper's Weekly, May 6, 1865 and in Frank Leslie's Illustrated News, April 29, 1865. The sketch is by Alfred Waud, in the Library of Congress collection. The photo was taken by Julius Ulke on April 15, 1865 after Lincoln's body was removed from Petersen House. The photo disappeared for one hundred years. Then in 1965, it was printed in American Heritage. Reproduction of the paper was based on this collection of documentary sources.

In some instances, complete rooms of historic wallpaper remain intact. The conservation of complete rooms of historic wallpaper poses complex technical questions, the most fundamental of which is whether the wallpaper should be treated in situ or should be removed from the walls for treatment.

At the Captain Edward Penniman House in Eastham, Massachusetts, an outstanding French flocked wallpaper and a ceiling paper awaited conservation. Built in 1867 by Edward Penniman, a New England whaling Captain, it is a French Second Empire house, with which the wallpaper style is very much in keeping. The flock paper is red with a gray background, in a rich Rococo design. The ceiling is an elaborate, machine printed paper. Its center is filled with a small gold geometric pattern; its border is comprised of large bright blue and red flowers, outlined with a black border. The ceiling paper is pictured in Catherine Lynn's new book Wallpaper in America. It is an outstanding ceiling paper and one of the few remaining in situ in the country. That it still hangs with the wallpaper with which it was originally hung make the pair an outstanding treasure in the NPS decorative arts collection.

Unfortunately, the Captain Edward Penniman House is currently unoccupied. Some heat is maintained in the building, but the wallpaper and ceiling paper have experienced cleavage and tearing. Preventive maintenance and limited conservation are needed immediately. It is hoped that this care will be forthcoming this summer.

(Left) Ceiling paper and flock wallpaper in parlor, Penniman House, Cape Cod NS; and (below) plaster wall painting, mission church, Tumacacori NM.

Another nearly complete and significant wallpaper in the NPS collection is the Zuber scenic wallpaper, Paysage a Chasse, that hung in the main hall at Lindenwald. Martin Van Buren had this wallpaper hung in 1843. This paper has been removed from the walls and is currently being conserved by James and Patricia Dacus Hamm. The conservation treatment for this wallpaper is extremely thorough and complex. It was described at the Wallpaper Conservation Symposium at Andover, Massachusetts in April 1980 and will be published this fall in the Proceedings of the Symposium. Therefore, no attempt has been made to summarize the treatment.

This cursory tour of a selected sample of NPS buildings has only begun to scratch the surface of all the decorative surface finishes in our holdings. Additional tours, to look at machine-made finishes and other handmade finishes would reveal equally interesting examples of decorative arts and their related conservation problems and restoration solutions.

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Federal style is characterized by a light, delicate scale applied to overall proportions as well as to details. Decorative elements in geometric patterns, such as urns, swags, garlands, and festoons, were created in plaster and wood for ceilings and architectural trim. The basic architectural features include a square or rectangular house form with highly articulated door and window trim to accent an otherwise unadorned shallow relief facade. Interior spaces and house plans were set free by the use of curves, circles, elipses and octagons. The Custom House at Salem Maritime National Historic Site is a good example of this Federal style.

Beginning about 1820 and lasting until the Civil War, the Greek Revival style flourished in the United States. This style was introduced from England by the first true architect in America, Benjamin H. Latrobe. Latrobe's pupils and other builders, relying on handbooks, soon adopted the style. Its popularity was due to the identification with early Greek ideals of democracy and with Greece's war for independence. Based on Greek orders, Greek decoration and classical monuments of Greece, the style was used widely for civic, religious, and domestic buildings. The symmetrical forms of this style more often than not are identified by columns, pilasters, and porticoes. This classical temple form with its low-pitched gable, or flat roof employed very bold, simple moldings and cornices without much decoration. Columns, frequently the baseless Greek Doric order, supported bold, full entablatures with unadorned friezes. Rectangular transoms were also a feature. Examples range from designed works such as the Second Bank of the United States, 1819-1824, in Philadelphia; Federal Hall, 1842, New York City; Arlington House, 1802-17, Washington, D.C.; Chalmette, 1815, near New Orleans; and the Old Cathedral, 1834, in St. Louis; to vernacular houses such as the Andrew Johnson House, 1850, Tennessee.

Concurrent with the Greek Revival Style before the Civil War were a number of historical styles that gained popularity through romantic associations. These included the Gothic Revival, the Italianate, the Italian Villa, the Egyptian Revival, the Moorish Revival, the Renaissance Revival, the Romanesque Revival, and the Octagon style. Many of these styles were closely associated with contemporary artistic and literary currents and were advocated through architectural handbooks, some not without social statments and implications. One of the most pervasive of

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these styles was the Italianate, whose inspiration had been northern Italian vernacular farm houses. The Italianate is characterized by a rectangular form; a low, hipped roof with wide, overhanging eaves supported by decorative brackets; an entrance tower; entrance porches; cupolas; corner quoins; flat, arched or pedimented hood molds over windows; bay windows; balustraded balconies; and front or side loggias. The Martin Van Buren House in New York and the John Muir House in California, (both late 19th century) are good domestic examples, while Ford's Theatre (1863) in Washington, D.C. is less a characteristic urban example. Mass produced, cast iron elements also made the Italianate a widely used style for commercial buildings throughout the country.

The second-half of the nineteenth century was a period in which many new styles sprang up and existed side by side. Archeological correctness in the use of historical styles was generally passe. The new guiding principles were picturesqueness, variety, and adaptation. American architects had come to a realization that no one style was appropriate for a country that was inheriting all the cultures of the world; therefore, architects felt justified in creatively adapting historical styles or mixing different styles of the past in an eclectic composition. Most of these styles were used for many functions, but some were more widely used for domestic purposes: the Stick Style, a tall, vertically proportioned frame style with exterior diagonal boards expressing an internal structural system; the Queen Anne Style*, a combination of colors, textures and materials used with a variety of forms such as pediments, turrets, gables, chimneys, and other classical details; the Eastlake Style, a version of the Stick and Queen Anne, but with a rich proliferation of posts, spindles, brackets, lattice, pediments, etc., usually lathe-turned; and the Shingle Style, a shingle-clad adaptation of seventeenth-century New England houses.

Other styles were used with equal regularity for houses and civic or commerical buildings, such as the Second Empire Style, named after Napoleon III's reign and characterized by a steeply pitched, mansard roof. Still other styles were identified more with civic and non-domestic functions, as with High Victorian Gothic, with its polychromatic, freely

*Two examples of this style now owned by the Park Service are President Theodore Roosevelt's home, Sagamore Hill (built in Oyster Bay, New York in 1884-85); and Thomas Edison's West Orange, New Jersey Mansion, Glenmont (built in 1880).

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1. Great Hall, Grand Portage NM.
2. Scotty's Castle, Death Valley NM.
3. Muir House, John Muir NHS.
4. National Visitor Center (Union Station), Washington, D.C.
5. Paul Revere House, Boston NHP.

adapted Gothic forms; and the Richardsonian Romanesque, a strong, bold, heavy version of the Romanesque personalized by Henry H. Richardson.

The twentieth century began with two somewhat dichotomous architectural currents, both of which had flowered in Chicago in the 1880's and '90's. Strangely enough, Daniel H. Burnham, is closely associated with the advancement of both currents. Burnham and his partner, John W. Root, were among the innovative architects in Chicago who developed what can be called America's first indigenous architecture, the tall office building or skyscraper. Burnham and other architectural firms comprising the "Chicago School" had taken advantage of such technological advances as the structural steel frame and the elevator in order to develop this commercial style. The skyscraper continued to be developed, but after 1893, Burnham was advocating a new style. It was in that year that the World's Columbian Exposition in Chicago became the catalyst for a growing number of social and cultural forces, resulting in the era of the American Renaissance. The Exposition was a demonstration of the exuberant spirit of American capitalism identified by Beaux-Arts classicism. American architects trained at the Ecole des Beaux-Arts in Paris were well-prepared to design in this interpreted Greek/Roman/Renaissance style. The term American Renaissance not only refers to Italian Renaissance but also to the new spirit in America and to the collaboration of American painters, sculptors, and decorative artists with architects. Beaux-Arts classicism, with its monumental scale (not always), richly articulated symmetrical facades, axial and processional circulation and figurative sculpture, became largely a civic style due to its association with the City Beautiful Movement. An excellent example this influence is Union Station, 1903-08, in Washington, D.C. by Daniel Burnham. The Vanderbilt Mansion, 1896-98, near Hyde Park, New York, by architects McKim, Mead, and White, is an example of domestic American Renaissance. As the new century advanced, the robust forms of early Beaux-Arts classicism evolved into more refined strains of Neo-Classicism, such as some of the free, public bath houses at Hot Springs, Arkansas.

The early twentieth century was also a period of revived historical styles, many of them designed by architects trained in the Beaux-Arts tradition, and most of them in a more studied style than any earlier revivals. These "Period Houses" ranged from American colonial houses and Spanish colonial mission styles to English Tudor houses or French sixteenth-century chateaus. Scotty's Castle (1922-29) in Death Valley, for example, was designed in a Spanish/Moorish style.

The story of American architecture after World War I is largely that of modern movements: the Prairie Style, the Arts and Crafts Movement, Art Deco, Art Moderne, the International Style, and the more recent modern manifestations which have occurred since World War II.

The development of stylistic trends has always dominated the historiography of American architecture. Architecture of utility, whether for domestic, commercial, industrial, or for whatever function, has always existed along with the aesthetic forms. In some cases, this type of architecture was a less refined imitation of a high style. Typical examples of vernacular buildings were usually those that occupied the tenuous edge of civilized life, and as the frontier crept westward, settlers carried in their cultural baggage certain house forms from their past. Necessity and expediency saw that the earliest structures were generally crudely constructed one room log cabins. And as the frontier pushed onward, those who remained behind either added to the original building or constructed slightly more advanced structures as technology and prosperity permitted. In addition, early industrial buildings tend to fall into the vernacular class by reason of their utilitarian function. The diversity in these structures is not less than that of house forms, with examples ranging from small water-powered grist mills in the Great Smoky Mountains to the larger water-powered textile mills at Lowell, Massachusetts. Still more types of utilitarian architecture, more easily identified than categorized, are lighthouses, canals, bridges, and the like.

In addition to the above-mentioned examples of vernacular architecture, are two distinct building types without which a survey of National Park Service architecture would be incomplete: fortifications and monuments. The history of these building forms together with the developments in other expressions of vernacular architecture will be discussed by the author in the next issue of this publication.

CRM

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— TRAINING, from page 6.

NPS, with positions being targeted for parks, regional offices, and the Denver Service Center, the scope of NPS preservation needs had to be figured into the planning.

Armed with the building blocks of this new concept in training -- available positions, preservation projects, housing, and training goals -- the program was launched. Simultaneously, the mission of the program became increasingly clear -- to produce as many well-trained preservationists as possible in the shortest possible time.

During the early years, training activities centered around the Land Heritage preservation project at the C&O Canal. Project "77" was a multi-site, negotiated, fixed-fee construction contract with thirteen locations along the length of the canal. It involved various levels of preservation treatment in which the type of treatment was dictated by the problem. Preservation activities centered around work on the various lock tenders' houses (some of these stone, brick, frame, or log construction), on lift locks, on culverts, on earth embankments, and on towpath restoration. Project supervision, contract administration, and hands-on experience were all part of the interns' active training in preservation problems.

Training Center personnel also have been assigned a wide variety of projects away from the C&O Canal, projects such as the following: Jamestown ruins stabilization; the Carriage House at Colonial National Historic Park; structures at the Maggie Walker National Historic Site; preservation of the gun boat Cairo at Vicksburg; restoration of the Martin Van Buren home, New York; Caretakers House and Carriage House, Hampton National Historic Site; Old Faithful Inn, Yellowstone; Officers Row, Fort Hancock, NJ; Historic Structures Report on Piper Barn, Antietam National Battlefield Site; and research and project planning for the Army at Fort Monroe, VA.

At times during the early stages, keeping the intake trainees from becoming solely a skilled labor force had its ups and downs. Because of the highly refined skills represented, project directors tended to view the personnel in the program as a cadre of talent to be used rather than trained. But the development of well-trained personnel, rather than simply the completion of various construction projects was the main goal of the program.

Curriculum Committee

During the fall of 1979, a diverse cross section of people with various interests in historic preservation met in Denver to review and discuss the future of the intake training program. Identified at this meeting was the need for a curriculum committee to provide an overview of the program. This suggestion was considered and later implemented.

On a permanent basis, the Curriculum Committee comprises two permanent members -- the Chief Historic Architect from WASO who is the Chairman of the Committee, and the Architect in Charge from the Williamsport Preservation Training Program. On a one-year rotating basis, other positions are held by two Regional Historic Architects, a Division Chief from Historic Preservation at DSC, and one Chief of Maintenance from a field area, plus

Standardizing Historic Structure Preservation Guides

J. Keith Everett

A Historic Structure Preservation Guide (HSPG) is an action plan providing the information and direction necessary for park maintenance personnel to carry out housekeeping, and routine and cyclic maintenance in an orderly and timely manner. Ideally, each NPS historic structure that has reached its intended level of treatment should have a preservation guide prepared. Such a document ensures that the historic significance and integrity of that structure is consistently maintained.

While few would disagree with making such a document available to maintenance personnel, there are widespread opinions as to the type and amount of information a preservation guide should provide, as well as to the format in which it should be presented. In the past ten years, there have been a variety of preservation guides produced, and generally speaking, they have been less than successful. In retrospect, many of their basic problems can be traced to the absence of sufficient technical information coupled with the inclusion of information which, though interesting, is not essential to preservation maintenance. The format of a preservation guide is critical, and it is not difficult to find examples of a preservation guide which has failed simply because it was arranged and assembled in a manner not readily understood.

In an effort to simplify and consolidate the various directions Historic Structure Preservation Guides have taken in the past few years, a new format has been adopted and included in the Cultural Resource Management Guideline (NPS-28). Basically, the new format is modeled along the lines of construction specifications and includes three major components: Inspection Instructions, Preservation Instructions, and Materials Specifications. The rationale for adopting this particular format is its computer-compatibility, with the intent that someday the various technical sections may be selectively assembled in a short time frame as applicable to the building materials and components of a given structure.

At present, there are two preservation guides modeled after the format specified in NPS-28, namely the guides for historic structures at Herbert Hoover National Historic Site and the boyhood home and associated structures at Lyndon Baines Johnson National Historical Park. Both guides were time-consuming and costly. They took over a year to produce and cost upwards of fifteen thousand dollars, though they accomplished their purpose in being structure/site-specific in terms of preservation maintenance. Since each guide has been in existence only a relatively short time, it is too early to determine their ultimate success or failure. That both contain valuable information is unquestioned, but they have aroused debate over the intent and scope of a preservation guide, and challenged the notion of a standardized guide applicable to all types of historic structures.

Comments received thus far regarding the Herbert Hoover and Lyndon Johnson HSPG's have ranged anywhere from "far too specific" to "not specific enough." Some felt the format confusing and redundant while others found it logical and easy to use. There have been varying degrees of opinion as to what preservation guides should do, with some individuals taking the position that a preservation guide is strictly a maintenance manual and should confine itself to technical matters; others view the preservation guide in a larger role as not merely a technical manual, but a budget and personnel programming tool as well.

an alternate. The current Curriculum Committee members are as follows: Hugh Miller (WASO), Jim Askins (Williamsport Program, DSC-TNC), John Garner (Southeast Regional Office), Laurin Huffman (Pacific Northwest Regional Office), Harold LaFleur (North Atlantic/Mid-Atlantic Team, DSC), Jim Bentley (Blue Ridge Parkway), and alternate, Mike Strickland (Golden Gate National Recreation Area).

The Curriculum Committee meets bi-annually to evaluate the training program and review the development of each trainee. It also makes recommendations to the Manager, DSC, on the basis of the discipline mix and size of the program. The Committee identifies and secures preservation projects for the training center, and targets future positions for trainees who will be completing their training assignments.

The Future

Preservation construction projects represent the most important part of the trainees' experiences. Without the experience gained from direct project involvement, the program could demonstrate less success among its apprentices. Nevertheless, rising expenses have threatened this aspect of the program. In addition, the center employs only two staff members who travel from project site to project site. Thus, instructor and trainee are separated for periods of time during the training process.

With support and assistance from field areas, the current situation could be remedied. Funding need not always be siphoned from the line item construction program budget, but could come from any source. Indeed, projects often considered routine maintenance frequently provide the best training experiences.

The feedback from the field and from discussions with training program clients has been positive. The products actually produced by this program, i.e. trained preservationists, have been successfully filling the holes in our historic preservation program. They have functioned according to the criteria established by the training program and have served the park system in numerous capacities. Various parks can point to the structures these students helped to preserve as evidence of their preservation apprenticeship.

But with all the success to date, and with a commitment from the Manager of the DSC to support the program, the training of preservation specialists has not become institutionalized. There are problems of securing positions -- the program could train eight people at a time. There are difficulties in finding training projects to provide the requisite experience. There is even difficulty in finding permanent locations for these highly skilled preserveration specialists. But in spite of such hold-backs, the opportunity still exists for NPS employees to enroll in a program which can increase their preservation knowledge as well as their hands-on experience. The Williamsport program is one of the finest of its kind, and with greater enrollment, could very significantly affect the direction of the Service's historic preservation program.

CRM

James S. Askins heads the Williamsport Training Program.

Up to now, the primary emphasis in the development of HSPG's has been on standardizing these documents: finding a format logical in arrangement, adaptable to change as procedures or products improve, and computer-compatible for eventual selective mass production. The construction specifications format as called for in NPS-28 basically meets these criteria, and while not perfect, is at least a major step in facilitating inter-Regional exchange of technical information and eventual standardizing of HSPG's.

That such a range of philosophies exists regarding the scope of a preservation guide does not necessarily undermine the validity of a standardized approach to HSPGs, but it does suggest that there are variables which must be considered under any preservation guide format. Ultimately, there are four basic considerations which will determine the intent and scope of a preservation guide.

The first consideration is the significance of the resource. Historic structures with Category Ia significance, as defined in Management Policies, may require more detailed maintenance instructions than lesser-rated structures. The List of Classified Structures (LCS) management categories are also a useful tool in determining the level of detail. Certainly these management categories are useful in determining the priority order in which historic structures should receive preservation guides.

Not all structures with the same management category designation have equal status, which brings up the second consideration influencing the scope of a preservation guide: the use of a structure. The amount of latitude given maintenance personnel in dealing with their resources will probably be affected by the way those resources are managed and used. For example, Old Faithful Inn, a structure designed and still used as a hotel, will be approached differently than Longfellow House, now managed as a house museum. Both structures are Category A on the LCS, yet more rigid and detailed maintenance procedures may be exercised at the Longfellow House, whose importance is tied to a particular time period and whose structural integrity will allow little deviation. Historic Structure Preservation Guides for adaptive use, continued use, period display, and other types of historic structures are going to vary in detail and latitude regarding prescribed maintenance measures.

The capabilities of a parks maintenance staff is a third consideration. Depending upon the size of the staff, the personnel positions programmed, and the abilities of those individuals, a preservation guide may address only minor repair items or may go so far as to detail major work items. A guideline to follow in reaching an effective compromise may be the following: routine and cyclic maintenance items should be described in sufficient detail to facilitate the work.

The fourth consideration is the desired degree of Regional involvement (i.e. the number of referrals to the Regional Historical Architect for consultation regarding maintenance problems). This factor is going to be determined by the three previous considerations, particularly the park's maintenance staff. These individuals are entrusted with the care of the resources, and a preservation guide should be tailored to help them in every way practical and possible.

Standardizing HSPG's in the National Park Service is necessary if these guides are to be produced in sufficient sary quantities. The format adopted by NPS-28 is a significant first step which should not be lightly dismissed or ignored. There is now a basic frame work for organizing and presenting technical information which will speed inter-Regional exchange of information, and have enough flexibility to accommodate variations in intent and scope as previously discussed. Refinement of this or any other format will come only from experience through continued use.

Producing Historic Structure Preservation Guides in large numbers is going to require more than a standardized format, however. At this point,

See GUIDES, page 13.

Building for the National Parks in the Rocky Mountain West, 1872-1966

Rodd L. Wheaton

Yellowstone's natural wonders caught the imagination of Congress in such a big way that on March 1, 1872, President Grant signed a park bill into law which "dedicated and set apart Yellowstone as a public park or pleasuring ground for the benefit and enjoyment of the people." This document created the world's first national park. Except for poachers, the new park remained nearly inaccessible until 1877 when Superintendent Philetus W. Norris became the recipient of a regular salary and operational funding. A rudimentary road system was developed, and at Mammoth Hot Springs, park headquarters was built -- a log "blockhouse" of square notched log construction. The U.S. Army assumed control of the park in 1886, and in 1891 began Fort Yellowstone.

Old Faithful Inn (1923), Yellowstone NP.

In 1916, the fort became Mammoth Headquarters for the new Park Service. It accommodated the park administration while providing, most importantly, interpretation of the park. This service had originated early on with park concession operators, and had been extended from the lobbies of concession-built hotels.

The Yellowstone Park Association, an affiliate of the Northern Pacific Railway, provided an exclusive five-day grand tour of the park by stagecoach. Guests were transported through the park to hotels conveniently spaced a day's journey apart. The most notable hotel was the Old Faithful Inn, still the grande dame of the National Park Service concessions. Unlike the incongruous presence in the park of other hotels including the colonial revival Lake Hotel, Old Faithful Inn, dating from 1903, took inspiration from its surroundings. The basically symmetrical design by resident architect Robert C. Reamer relies heavily on horizontal banding asymmetrical gables, and crazy-quilt window sashes; the architecture focuses on the enormous lobby, opening through three levels of log and timber-supported balconies and orchestra galleries to the roof trusses.

The grand hotels of Glacier National Park are in contrast with Old Faithful Inn, and its inventiveness which draws from shingle, stick, and tudor styles contrasts to the grand hotels of Glacier National Park. Constructed for the Great Northern Railway in 1915, Many Glacier Hotel, is Swiss style frame construction around a four-story, pseudo-Ionic log columned naos lobby space. (Similar formality was reflected in Rocky Mountain National Park's proposed Horseshow Inn, about which it was reported in 1908: "Frank Lloyd Wright, the famous architect of Chicago, drew the plans and has produced a building which seems a part of the beautiful landscape rather than a mar upon it, as is so often the case with summer hotels.")

Elsewhere, a concessions-built structure like Glacier's more intimate Lake McDonald Lodge, built in 1913, and the circa 1925 Bryce Canyon Lodge and cabins designed by Gilbert Underwood of Los Angeles for the Union Pacific Railroad, provided the visitor with a basic preconceived, if not contrived, park experience. The hotels were wilderness stage sets, adorned literally with the trappings of the frontier. They were completed however with telephones, modern plumbing, steam heat, and luxury services from barbering to gourmet dining.

As exploited by the park concessioners, this uniquely American architectural theme, whether inspired by the Swiss Alps or the romanticism of the frontier, became known as the "Rustic Style." It used the elements of log construction, steeply pitched gabled roofs, and casement sashes. Hotels with log structural systems, and sapling and barreled balustrading exemplify the full development of the style, enriched as they were with decorative shingling, carved wooden detailing, and hickory furniture.

By the 1920's, the fledging National Park Service had assimulated the concessioners' concept of rustic architecture. This move was based more likely on the availability of materials and the demands of a modest budget than on questions of taste. Such considerations had been made earlier by the U.S. Army with the construction in 1908 of the Norris Soldier Station. Although detailed with such architectural conventions as shed-roofed dormers and multipaned bay windows, the station became a prototype ranger station design, incorporating even buttressed log crowning. Notched log construction, in a variety of detailing and fabrication, was adapted too, not only for small park ranger stations but also for employee housing and interpretative facilities.

Quarry Visitor Center, Dinosaur NM.

Meeting the demands of park maintenance, the construction of utility buildings paralleled the development of other visitor services. Typically, the rustic theme was employed. Planned for equipment storage and warehousing, the construction of exposed half-log frame and vertical board structures with log pole roof systems was favored. Traditionally, the structures were painted dark brown, as a further concession to the natural park concept. The roofs, had doubled shingle courses, and the window sashes were painted green.

Stone masonry construction early on contributed to the American love of fireplaces characteristic of U.S. affection for hearth and home culture and for the pioneer spirit of log cabin construction. At Old Faithful Inn, 500 tons of stone were used in the construction of a massive stone fireplace and chimney stack which essentially

Visitor Center, Cedar Breaks NM.

supports only a giant wrought copper clock. Similarly, even the simplest structure, such as the Museum at Cedar Breaks National Monument, was not complete in plan and elevation until a stone masonry fireplace was installed.

The use of peeled log and stone construction developed rapidly during the *major park building program begun in* 1933. This effort came under the Public Works Administration which constructed many Service structures. The prevalence of this style which complemented the natural surroundings of the park gave rise to the term "parkitecture." Early structures, those considered to have been temporary and below design standards, were replaced, while the style of others, such as Yellowstone's Norris Museum (1929), were emulated.

As an alternative to rusticity, particularly in the Southwest where indigenous styles of native architecture existed, designs and detailing developed around the theme of cultural parks. Such was the case at Mesa Verde National Park. When he realized that a 1917 log museum structure did not "carry out the atmosphere" of such an important archeological site, Superintendent Jesse Nausbaum and his wife began a construction program in 1921 which resulted in the completion of fourteen structures, again with WPA-CCC assistance, in the style termed "Mesa Verde Modified Pueblo."

Thus, the structures were completed with canted stone walls and with roof parapets pierced by large peeled fir log vigas supporting flat roofs. Log colonnades with bolster blocks screened entrance portals which sheltered adzed, finished woodwork and furnishings derived from Spanish colonial origins.

In the 1950's, after a decade of minimal building activity, it became apparent that much of the existing park facilities were not well suited to meet the demands of a new generation of Americans traveling to the national parks. "Mission 66" was born. New directions in interpretation -- audio-visual equipment -- dictated larger visitor centers administered by larger park staffs to accommodate larger groups of people. Thus in 1956, the Park Service reached beyond the traditions that had been perpetuated by the Western Office of Design and Construction, and collaborated with the San Francisco architectural firm of Anshen and Allen for the design of the innovative Quarry Visitor Center at Dinosaur National Monument. The liaison produced a design termed "quite modernistic, if not septic" by career Park Service personnel. However, the interpretative aspect of the site, an exposed quarry of dinosaur bones, dictated a large open space sheltering the year-round paleotologists "reliefing fossil bones." Defining the dual fuctions of administration and interpretation, the soaring V-roof, like the ramp approaches and booked birch veneer interiors, reflected the then current architectural trends of the International Style. A design precedent was set.

Initiated to update the facilities of the system, the "Mission '66" program produced a folio of standardized designs, employing standardized materials, such as those used at the Quarry Visitor Center, compiled by Park Service design offices. As a consequence, by 1966, individual park environmental considerations had been ignored and a Service-wide blandness was produced. Only the recent construction of the Bear Lake Shelter, Rocky Mountain National Park, and the Rainbow Point Kiosk, Bryce Canyon National Park, has paid homage to the National Park Service's highly original contribution to public architecture.

CRM

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... GUIDES, from page 11.

there is no central data base for collecting, synthesizing, and dispensing preservation maintenance-related information. Preservation guides, including those following the new format, are being produced in a very sporadic manner, either contracted out or produced at the Regional level with little, if any, knowledge of what other Regions have done or are doing. A cental data base could avoid the duplication of effort, the lengthy time periods, and the extremely high costs associated with the guides now being produced.

Also, there needs to be a concerted effort to familiarize maintenance personnel with the intent and scope of HSPG's as specified in NPS-28. Their familiarity with the basic components and types of information within a preservation guide would allow park staffs to begin to gather and assimilate pertinent information for eventual inclusion in such documents. It is essential to involve maintenance staffs in the formulation of preservation guides. Very often, these staffs are composed of local people who know the resources better than anyone else. It seems somewhat illogical to produce a maintenance manual for maintenance personnel without their direct involvement. Region-instigated standardization of HSPG's is necessary, but the ultimate success or failure of these documents rests with the individuals who use them. Their support must be solicated in the earliest stages of preservation guide development.

Standardizing HSPG's will ultimately involve three essential conditions: a standardized format understood by all concerned, a central data base for collecting, storing, and dispersing information, and the involvement of maintenance personnel in preservation guide development. The National Park Service has seriously considered only the first. Attention must now focus on addressing the two remaining conditions for preservation guide standardizations.

CRM

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Monitoring Structural Movements

Todd E. Rutenbeck

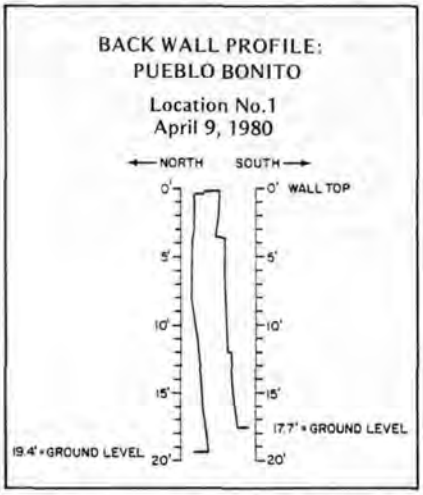
Most historic structures and ruins have some structural defects. These include cracks, foundation settlement, tilting walls, deteriorating materials, and weakened structural members. Such defects are not always a threat to structural stability. For example, a building may have developed cracks due to settlement shortly after construction. If the settlement has stopped and the cracks are no longer widening, the building may be structurally sound even though it is cracked.

In some cases, the defects do threaten structural stability. Unstable structures fall into two general categories: 1) those whose geometry or material strength are so unstable that small increases in loading from public use, wind, vibration, or other sources could cause instant collapse; 2) those having defects that are slowly increasing and will gradually lead to collapse or serious damage in the future. Monitoring of structural movements is of no benefit for defects in the first category since collapse would be instantaneous. Such problems can be detected by measuring current structural geometry, testing material strength, and computing safety factors for various loading conditions. Monitoring of structural movements is useful in detecting defects in the second category. For example, suppose a building containing ten major structural cracks is to be preserved. One approach would be to provide new foundations for all walls, and install tie rods and bracing for cracked and leaning sections. Another approach would be to measure crack width changes in the ten cracks for about one year before preservation work is planned. It may be that only one or two of the cracks are currently widening and preservation work can be limited to these critical areas. The other cracks may have been stable for many years and require no structural repair.

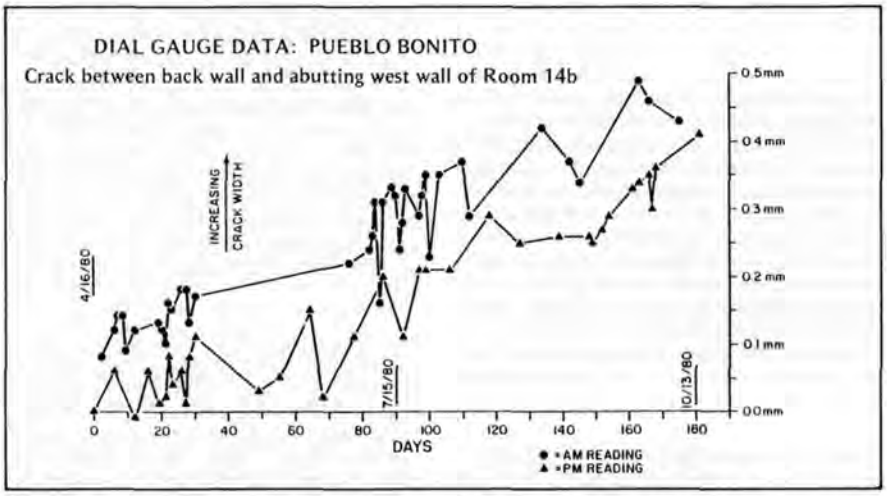
It must be understood, however, that all structures move. Temperature changes, wind, snow loading, vibration, and loading from people and objects, all cause structural movement. The dangerous movements, however, are progressive movements. When people enter a building, the floor will deflect under their weight. The amount that the floor goes down may not be visually detectable, but it could be measured with instrumentation. When the people leave, the instrumentation would indicate that the floor returned to approximately its original position. Small structural movements of this type are normal. Progressive movements, however, are of concern. Suppose that one wall of a rectangular building has tilted outward from the building, leaving a crack on each end where it abuts the two adjacent walls. Instrumentation installed on the two cracks has provided data on change in crack width for one year. Seasonal and daily changes in temperature and moisture will cause the width of the cracks to change. If these are the only changes taking place, a plot of change in crack width versus time will fluctuate above and below the zero line, but at the end of the year, the average change would be close to zero. If, however, an inadequate foundation is causing the wall to continue to tilt, there would be a progressive widening of the cracks in addition to the seasonal variations, and the change in crack width would continue to increase with time, never returning to zero. Such progressive structural movements can lead to collapse.

Visual estimates and memory are unreliable in detecting structural movements. Frequently, one person will think a crack has increased considerably over the years, while another is convinced there has been no change. Instrumentation has two functions. It gives definite data on whether or not a portion of a structure is moving, and it gives the rate of movement which is an indication of how soon failure may occur.

There is almost no limit to the complexity of monitoring equipment that could be used. It is best, however, to use the simplest equipment that will provide sufficient data for making preservation decisions. In most cases, critical structural movements can be detected as either changes in crack width, wall tilt, settlement, or deflection. The factors in choosing an instrument for any type of movement include accuracy, cost, and ease of data gathering. For example, changes in crack width could be measured with a ruler and recorded manually or with



The profile of this tall masonry wall was obtained by measuring from a plumb bob line on each side of the wall. The geometry of the profile indicates lack of stability. The center of mass of the wall appears to be almost above the lower corner of the north side of the wall indicating that small additional loading could cause collapse.



These data show the change in crack width between the wall (shown in profile to the left) and an adjacent wall. In addition to its unstable geometry, the wall is continuing to tilt farther to the north. Plans are underway to install a permanent brace to prevent collapse.

This dial gauge installation produced the data in the line chart. The gauge is mounted on top of a wall on one side of the crack. A metal plate is attached to the taller back wall. The spring-loaded spindle of the gauge rests on the metal plate, but is not attached to it. As crack width changes, the spindle moves and changes the position of the gauge hands.

A custom made gauge system. The machinist's calipers have been modified by putting a small hole in each jaw. The holes fit over the stainless steel cones of the gauge points during reading. One set of calipers is used to read numerous gauge points at one site. Caliper accuracy is checked by taking readings on stainless steel rods of known length.

An electronic gauge in place. This gauge is a linear variable differential transformer (LVDT). Its operation is similar to the dial gauge with a spring-loaded spindle resting on a bracket except that it produces a voltage output that can be read at a remote location.

Precise leveling equipment being used to measure settlement of ruins. While similar to conventional surveying in technique, specialized equipment allows direct readings of 1/10 mm with estimates to 1/100 mm.

electronic gauges that automatically transmit the data to a distant office where the reading is continuously plotted automatically or stored in a computer. In most cases, equipment somewhere between these two extremes is appropriate. If the accuracy of the ruler is 1 mm, it would take several movements of more than 1 mm to establish a trend. Thus, this method would be acceptable where large movements were taking place in a short period of time. The electronic gauge may have an accuracy of 0.001 mm. Thus, a trend could be determined long before a total movement of 1.0 mm takes place.

In some cases, more than one gauge type will be used at one site. Again using the example of measuring change in crack width, suppose that a structure has several major cracks, some in the walls and some in a high, vaulted ceiling. Since the cracks are old, it is likely that they are moving slowly, and direct measurement with a ruler would not be accurate enough. Assuming there is little interest in daily fluctuations, readings taken once a month will be sufficient to determine long-term trends. Since the walls are easily accessible, there is no need for a remote readout. To minimize cost, one of numerous types of mechanical gauges could be used and would be reliable and accurate.

For the ceiling cracks, however, the mechanical gauges may not be appropriate. It is necessary to get to the gauge to read it, and erecting scaffolding every month may be far more expensive than the cost of electronic gauges with a remote readout. The wires from several gauges can go to a central point where the power supply and readout meter are located. All gauges can be read from one meter by plugging in the cables from each gauge, one at a time. In some applications, strip chart recorders are useful in detecting the effects of wind, seismic activity, sonic booms, and other temporary loads. In most cases, however, continuous recording only produces more data than is needed, and the great volume of paper produced is often stored without being analyzed. Periodic readings, recorded manually, and plotted as a function of time, will show long-term trends in structural movement.

In choosing instrumentation, it is important to realize the difference in the instrument's smallest reading and its accuracy. Using an extreme example, suppose that a measuring tape were made with lines spaced 2 mm apart, but the tape was incorrectly numbered with each line counted as 1 mm. Someone unfamiliar with the metric system using this tape may assume that his measurements were accurate to the nearest millimeter when, in fact, they are inaccurate by a factor of two. The smallest reading of his tape was 1 mm, but that was not the accuracy. Likewise, an electronic gauge may be giving readings to the nearest 0.0005 mm or more, but changes in temperature, humidity, and other factors can affect the instrument to make the accuracy much less than the smallest reading.

While changes in crack width have been emphasized, similar considerations of accuracy, cost, and ease of reading apply to equipment for other structural movements. Large changes in wall tilt can be detected by using a plumb bob to plot the wall profile from time to time. Detecting small changes, however, would require the installation of permanent plumb bob brackets for precise readings on the string or wire. Accurate measurement of differential settlement can be accomplished with precise leveling equipment. While similar to conventional surveying, the readings are in tenths and hundredths of a millimeter rather than in tenths and hundredths of a foot. Either the electronic gauge or the dial gauge discussed for crack width changes would also be appropriate for measuring deflection of beams or other members. In some cases, triangulation, tilt meters, photogrammetry, electronic distance meters, and numerous other techniques may be appropriate. Complex equipment does not always improve accuracy, however, and the time involved in taking and analyzing data may discourage frequent assessments of structural stability. Use the simplest technique that will give the needed data.

Before undertaking a structural monitoring program, it is important to know the limitations as well as the benefits. Monitoring is a technique of detecting structural problems, not of solving them. If a structure is known to be in motion, monitoring is merely procrastination, or at best, confirmation. If collapse is likely to be instantaneous, monitoring is of no value and may give a false sense of security. If, however, knowing the rate of change in structural defects will directly affect the decision to repair or not repair ruins or historic structures, structural monitoring is appropriate.

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CURATORIAL COMMENT:
The Museum Role of the Park Service

Ann Hitchcock - Chief Curator, NPS

One of the most pervasive yet subtle problems facing the curatorial community of the Park Service is the need for recognition. Both within the Service and with the general public, there is a lack of awareness and acknowledgement of the NPS role in museums, despite the fact that the Service has been in the museum business since its inception.

In 1920, Stephen T. Mather, the founding director, set the tone for museum development in the Park Service when he said that "one of the most important matters to receive earnest consideration is the early establishment of adequate museums in every one of our parks." Though most parks now have museums, many of them cannot be considered "adequate" in the areas of preservation and curatorial care.

Resources, whether wildlife, scenery, historic structures or collections, provide the foundation for research and interpretation that lead to public education and enjoyment. Deterioration of these resources means deterioration of the entire park system. Rapid growth of NPS resources without a concomitant growth in operating funds has placed severe limitations on park programs. A full one-third of the total sites in the Park Service have been added within the past 12 years. This rapid growth has placed increasing pressure on curation programs, bringing the Service to the point where only 10 percent of its approximately 10 million objects are catalogued. Park Service standards for curatorial care are in line with those of the museum profession. In fact, the Service has some superior storage and conservation facilities. However, it also has many that are substandard.

Many of the problems may be attributed to financial constraints, yet equal weight must be given to the Service's lack of awareness and emphasis regarding the museum role of parks and the responsibility park management has to give adequate curatorial care to collections. Attesting to this low curatorial profile are the superintendents' annual reports (FY 1979). Out of the 238 documents submitted (from 8 regions), only 61 even mention museum collections, and a mere 16 provide useful statistics such as numbers of items acquired or catalogued. By contrast, training courses attended, number of arrests made, and numbers of visitors attending various movies, talks and walks were more regularly and uniformly reported. Clearly, the level of managerial concern for collections and curatorial functions needs to be increased and park staffs need to be made more aware of their responsibilities for collections.

In response to this need, several programs are being discussed and implemented through the Office of the Chief Curator and the Museum Services Division (Harpers Ferry Center).

1. Baseline Data -- Quantification of information on acquisitions, cataloguing, loans, thefts, deterioration, conservation treatments, and funds budgeted for curation and conservation are needed for curatorial management at park, region and servicewide levels. Concrete data is required to justify positions, programs and appropriations. Adjustments in the budgeting and activity reporting processes are being sought.
2. Professionalism and Training -- The present practice of assigning curatorial responsibility to staff lacking required training is unacceptable. Plans are being made to provide greater access to curatorial training through development of local and regional programs. Though it is not feasible for every park to have a curator, all parks with collections must have ready access to curatorial expertise. Studies are being made to determine how greater access might be accomplished, e.g. through regional curators, "circuit rider" curators, contract curators, cooperative agreements or off-site storage in Park Service Preservation Centers.
3. Collections Policies -- Revision of policy and procedures will assist parks in meeting their curatorial responsibilities. All parks need to write and implement a Scope of Collections Statement; the Cultural Resources Management Guideline (NPS-28) is being revised to provide more emphasis on collections; revisions in regulations are being sought to improve management of collections.
4. Upgrading Storage and Services -- To bring storage up to standard and provide adequate curatorial and conservation sevices, project funding is being made available through programs such as the Cultural Resources Preservation Fund.
5. Accreditation -- To provide parks with greater status in the museum profession, a program of accrediting Park Service museums is being explored with the American Association of Museums.

The implementation of these programs should contribute to providing greater recognition of the curatorial functions and the museum role of the Park Service. In order to succeed, the programs need servicewide support. Concerns expressed at recent regional and servicewide meetings have indicated that awareness and understanding of curatorial needs is increasing. The programs outlined are an initial response to those concerns.

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