

NCPTT NOTES

National Center for Preservation Technology and Training

UNITED STATES DEPARTMENT OF THE INTERIOR • NATIONAL PARK SERVICE



NCPTT's Museum Lighting Research

Several recent projects supported by NCPTT's Research component focus on the effects of light on museum objects.

Exhibit lighting is a core issue in museum environments. Galleries need sufficient light for visitors to view exhibits but, at the same time, works of art on display must be protected from damage caused by excessive light exposure. Museum lighting specialists traditionally have dealt

with this problem by working to strike an appropriate balance between the two concerns. Recent studies, however, have shown the issue of museum lighting to be significantly more complicated, and curators, conservators and exhibit designers have begun to consider factors such as visual perception, color temperature and different types of artificial illumination as part of the overall lighting equation. Consequently, lighting has emerged as

a research priority for museum professionals, and NCPTT has responded by supporting innovative work on museum lighting.

Past and current projects

"Beyond Edison: Lighting for the Next Century," a 1996 conference organized by the National Park Service and the Washington Conservation Guild, was the first NCPTT-supported project to address museum lighting issues. Topics examined at the conference included practical issues in museum lighting, the relationship between lighting and visual perception, and new lighting technologies. Presenters included conservators from the National Gallery of Art, the Canadian Conservation Institute, Yale University and the National Air and Space Museum. The conference was particularly successful in establishing an agenda for research on museum lighting issues by identifying areas that need further study.

NCPTT first supported applied and fundamental research on museum lighting with a 1997 Preservation Technology and Training Grants award to the Lighting Research Center at Rensselaer Polytechnic Institute in Watervliet, New York. NCPTT support allowed Research Associate Professor of Architecture Christopher Cuttle to examine a promising method for reducing the exposure of museum exhibits to damaging inci-

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NCPTT NOTES

JULY 1999
NUMBER 32

PTT Publications
No. 1999-13

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NCPTT Notes is published by the National Park Service's National Center for Preservation Technology and Training. The mail list for NCPTT Notes is subject to request under the Freedom of Information Act. Persons or organizations not wanting to have mail list information disclosed should unsubscribe.

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NCPTT's Museum Lighting Research

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dent radiant power without compromising visitor viewing satisfaction. Cuttle's work proved successful and is described further on page 3 of this edition of *NCPTT Notes*.

NCPTT's research on museum lighting continues with two current projects.

Colored pencils

The first is a study of organic pigments in colored pencils being conducted by the Institute for Standards Research of the

American Society for Testing and Materials with financial support from NCPTT and the Samuel H. Kress Foundation. The principle investigator for this project is James Martin, Director of Analytical Services and Research at the Williamstown Art Conservation Center in Williamstown, Massachusetts, with assistance from Mark Gottsegen of the University of North Carolina at Greensboro, and Joy Turner Luke of Studio 231 in Sperryville, Virginia, as well as the Colored Pencil Society of America in Washington, DC. The goal of this project is to determine the lightfastness of pigments in colored pencils for the benefit of artists and conservators.

Colored pencils traditionally have been used in preparing architectural, city planning and fine arts drawings. The permanency of colored pencil drawings depends largely on the lightfastness of the pigments in the pencils used to create it. The research team's work began with developing an analytical method for identifying organic pigments in colored pencils. When satisfied with the accuracy of the testing method, Martin and his colleagues will continue with analyzing pigments found in more than 300 colored pencils obtained from major pencil manufacturers. The final project report will describe the testing method and pigments identified in each pencil tested. The list of pigments will provide art conservators with an invaluable resource as they work to preserve historic drawings from fading and other forms of damage caused by excessive light exposure. It also will serve artists in making informed choices about pencil selection with the long-term stability



Graduate students in the Applied Vision Institute at Brooklyn College/CUNY compare the appearance of the same picture in two "museum rooms" illuminated by different light sources

of their drawings in mind. The research team expects to complete the project by November 1999.

Color temperature and illumination

The second current NCPTT museum lighting project is supported by a two-year PTT Grants award to City University of New York for a systematic study of color temperature and illumination intensity in museum environments and their effects on visitor viewing satisfaction. The project is a collaborative effort among CUNY Professors Israel Abramov and James Gordon, and Steven Weintraub, a private conservator with Art Preservation Services of New York, New York.

In most museums, gallery illumination levels are set by curators whose judgment is guided largely by experience and intuition. This project seeks to provide guidance on museum lighting design through innovative research that addresses psychological aspects of human perception in viewing museum exhibits.

Preliminary investigations suggest that modest increases in color temperature improve viewing satisfaction without increasing harm to museum objects. To test this hypothesis, research will focus on color vision and color appearance through the use of a controlled testing method that permits direct evaluation of hue, saturation and brightness. Then, in simulated museum envi-

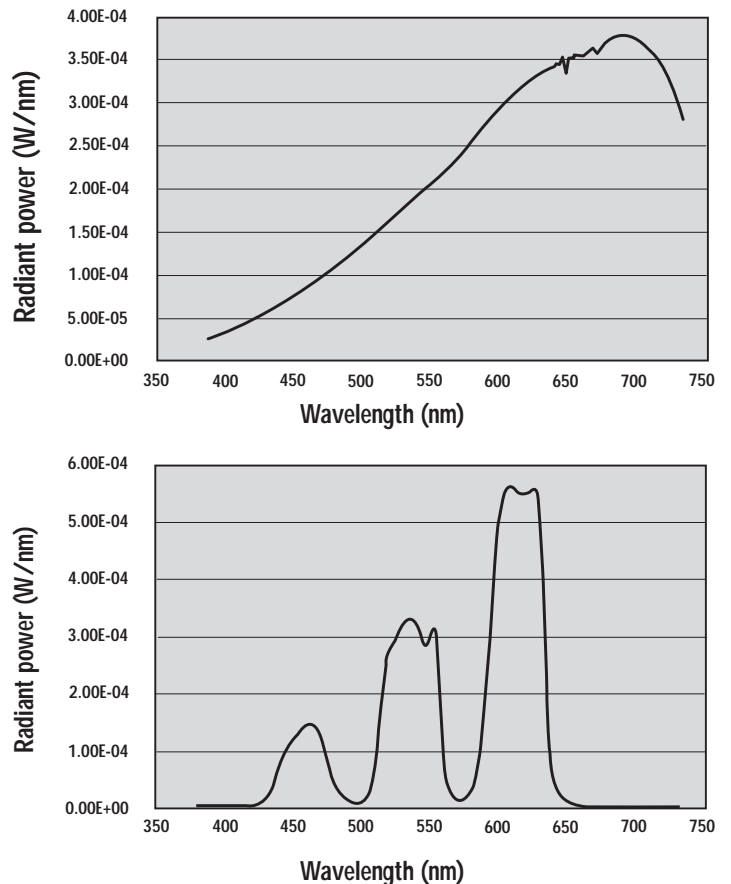
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Museum Lighting Protocol

In the last decade, conservation scientists have given increased attention to a wide range of museum lighting issues, particularly the damaging effects of light on museum objects. Research has shown that two processes cause light damage: photochemical action, which causes fading, chalking and loss of strength, and radiant heating, which causes surface cracking and embrittlement. To slow degradation rates, museums typically use filters to eliminate harmful non-visible short wavelength ultraviolet energy and long wavelength infrared energy. Curators also limit illumination levels and exposure duration for exhibits containing materials susceptible to damage. Such measures however, may afford only modest protection to artworks and artifacts, and dim gallery light-

ing often compromises viewing satisfaction for museum visitors. As a result, museum staff continue to face challenges of caring for collections with appropriate conservation practices while providing visitors with quality viewing experiences.

A 1997 PTT Grants project made significant progress towards reaching a workable solution to this long-standing problem. Christopher Cuttle of Rensselaer Polytechnic Institute examined an innovative lighting technique that promises to reduce rates of light-induced damage without affecting viewing satisfaction. Cuttle's research was in part inspired by recent studies on the relationship between light and human color discrimination. A pilot study conducted in the early 1990s suggested that light concentrated in three



An MR lamp (top) and an experimental three-band source (bottom), both at 2850K

NCPTT's Museum Lighting Research

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ronments, expert and untrained observers will evaluate the appearance of artworks displayed under varying color temperatures and levels of illumination. From the results of these tests, the research team will develop criteria for optimal museum lighting specifications that allow quality viewing experiences without causing significant light-induced damage to displayed artworks and artifacts. The research team expects to complete the project in 2000.

Lighting promises to remain at the forefront of research in museum conservation studies. As part of a broad commitment to support work in conservation, NCPTT's Research component expects to continue its involvement in museum lighting research. The successes of NCPTT's past and current projects demonstrate the potential for work on museum lighting issues to yield significant research advances.

spectral bands — with center wavelengths of 450, 530 and 610 nanometers — could provide levels of illumination equal to standard broad-spectrum museum lighting with substantially reduced levels of damaging incident radiant energy. Based on these findings, Cuttle sought to evaluate three-band lighting under actual museum conditions and to develop recommendations for a three-band lighting protocol.

Cuttle conducted laboratory tests at the Lighting Research Center at Rensselaer's Watervliet Facility in Watervliet, New York. In Cuttle's experiment, sixteen persons were to give subjective evaluations of three artworks displayed in two identical galleries. One gal-

lery, serving as the control for the experiment, was illuminated to 50 lux by a tungsten halogen MR spotlight commonly used in museum environments. In the other gallery, each of the sixteen subjects adjusted illumination — alternately provided by an MR spotlight and the experimental three-band light source — to match the appearance of the first gallery. In evaluating differences in appearance between the two galleries, subjects considered five factors: brightness, clarity, acceptability of overall color appearance, brightness or colorfulness of individual colors, and naturalness of individual colors.

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Microorganisms and Stone Degradation

Scientists recently have recognized that microorganisms such as bacteria, fungi and lichens act in conjunction with atmospheric pollutants to cause damage to stone. Studies have shown that in some instances, bacteria on stone surfaces produce corrosive organic acids when exposed to pollutants, resulting in significant stone degradation. But the scientific understanding of these processes remains limited and, because of the many variables involved,

microorganisms — in an effort to ensure the success of stone conservation programs worldwide.

Recent advances

An NCPTT-sponsored project now nearing completion has made significant contributions to understanding of the effects of microorganisms on stone. In 1997, Ralph Mitchell, Gordon McKay Professor of Applied Biology at Harvard University, began a long-term study with three major re-

consolidants and environmentally acceptable biocides, on pollutant degraded limestone. Mitchell considers each of these goals essential for a thorough understanding of the roles of microorganisms in the stone degradation process.

During the project's first year, Mitchell undertook a comparative analysis of the effects of sulfur and hydrocarbons on microflora found on eighteenth-century limestone grave markers in relatively polluted and unpolluted areas of Massachusetts. His work determined that the total populations of bacteria and fungi on limestone in the polluted area were significantly smaller and considerably less diverse. At the same time, however, populations of several types of bacteria capable of using sulfur compounds and hydrocarbons were much larger in polluted areas, presumably because they are able to thrive in an environment with a plentiful supply of pollutants. Mitchell found that these bacteria use small quantities of pollutants to produce sizeable quantities of acid.

In the second year of research, Mitchell investigated corrosive processes involved in limestone degradation. His work isolated and identified the predominant microorganisms growing on stone in the polluted area. Bacteria belonged to the genera *Bacillus*, *Vibrio* and *Xanthomonas*, and major fungi groups included *Aureobasidium* and *Cladosporium*. Mitchell inoculated these microorganisms onto sterilized limestone samples, which he then exposed to sulfur and hydrocarbons in an environmental chamber. During exposure to low concentrations of sulfur

and hydrocarbons, large populations of these microorganisms developed and produced significant quantities of corrosive acids in less than one month.

By studying the growth of these microorganisms with an electron microscope, Mitchell determined that limestone degradation results from a complex interaction of fungi and bacteria. Fungi initially grow into exposed pores on the surface of stone, which in turn allow large populations of bacteria to reach the interior where they produce substantial damage. This finding alone represents a major advance in understanding limestone deterioration by microorganisms.

Mitchell also made a surprising discovery during the second year of the project. Using electron micrographs, Mitchell found populations of an unusual striated bacterium less than one micrometer in size on some limestone samples. The bacterium had gone unnoticed in previous studies, and Mitchell theorizes that it may have an important effect on the stone degradation process. Mitchell is currently attempting to identify the bacterium in an effort to accurately assess its significance.

Future studies

Mitchell's plans for further research include extensive study of the kinetics of calcium dissolution from limestone caused by microflora. In particular, he intends to compare calcium loss by microorganisms on stone samples from polluted and unpolluted areas. Because previous efforts to measure calcium loss from limestone failed to produce



Bacterial and fungal decay of marble headstones

it is difficult to assess the relative importance of microbial processes in pollution-induced stone degradation.

Exposure of historic buildings and monuments to extremely high concentrations of atmospheric pollutants in recent decades has heightened concern about these issues. Researchers now are working to reach a better understanding of stone decomposition — including the roles played by

search goals. Mitchell's first priority was to accurately determine the response of microflora on limestone to atmospheric pollutants such as sulfur and hydrocarbons. Second, he sought to evaluate the interaction of microorganisms and air pollutants and the resulting process of stone deterioration. Third, Mitchell plans to determine the effect of protective measures, specifically the use of polymeric

Documenting Complex Curved Surfaces

The maritime preservation community is faced with the daunting task of recording what remains of our floating maritime past. Challenges in documenting maritime resources are quite different from challenges in documenting architectural or engineering resources. The primary difference is the shape of the objects themselves. Most buildings respect construction principles such as plumb, level and square — concepts easily replicated on the drawing board. Builders of watercraft, however, often considered these principles an affront to good design, and the shipboard recorder can seldom work with a straightedge.

Historic vessels, from large ships to small boats, are composed of compound curvilinear surfaces. Methods used to record these shapes have existed for as long as these vessels have been built and have remained largely unchanged to the present. To record these difficult shapes successfully by traditional methods, a fair amount of skill and knowledge must be brought to the job at hand. Often the person documenting watercraft has training in naval architecture, as the drawing component of the task often requires that level of sophistication.

Traditional methods

Traditional methods of measuring a vessel begin with establishing a grid system exterior to the boat from which

measurements are made. The next step involves blocking the boat or ship to be measured into a plumb and level position within the grid system. While easy with a 200- or 300-pound boat, the task is much more difficult for a vessel that weighs 200 or 300 tons. The measurement team then divides the length of the ship into equal units called stations and begins the measurement process.

Distances are measured out from the centerline of the keel and up to the hull, and recorded on paper as X and Y coordinates, with the Z coordinate being the distance of the station from the forward end of the ship. These measurements are taken with plumb-bobs and tape measures. Again, this procedure is fairly straightforward on a small boat inside a shop, but more complicated on a four-story, 300-foot long ship in dry-dock.

Once the measurements have been gathered, along with measurements that describe the shapes of the ends of the vessel, the process is reversed on paper: a grid is drawn at a convenient scale, and the X, Y and Z coordinates are transformed into a two-dimensional drawing. Three views are traditionally drawn to represent the shape of the hull measured — a sectional view, a plan view and a profile view.



Total station in use at Mystic Seaport Museum

The hand-measuring and drawing process is time consuming. By adapting electronics to measure and draw the vessel, costs can be reduced and documentation accuracy increased.

Electronic methods

With speed and accuracy in mind, Mystic Seaport Museum turned to electronic equipment commonly used in land surveying — the coordinate measuring machines surveyors called “total stations.” These machines are capable of returning accurate measurements of objects both near and far, typically by recording a horizontal angle, a vertical angle and a distance to a target. From this information, X, Y and Z coordinate data for the point measured can be deduced. The digital data then can be interpreted with yacht-design software, and the original surface measured can be modeled electronically. With funding from NCPTT’s Preservation Technology and Training Grants program, a

Sokkia PowerSet 3000 Total Station was purchased, and a method was developed to measure watercraft.

The total station approach changes the traditional documentation process dramatically — chiefly by freeing the measurement team from leveling the vessel, setting up a careful grid system, dividing the hull into sections, recording the measurements and transferring the data to paper. To measure a vessel electronically, the total station is set on its tripod in one or more locations where everything to be measured can be seen. The operator shoots the location of a 10-mm-square reflective target held by an assistant on the surface of the ship. The machine records the angles and the distance to the target and converts that information into X, Y and Z coordinates at the push of a button.

After all measurements are captured digitally, the total station is plugged directly into a

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NCPTT Projects in Partnership

Although NCPTT's Preservation Technology and Training Grants program is the most visible of NCPTT's activities, equal in importance in advancing preservation practice are projects that NCPTT develops in-house and directly with partners.

Among NCPTT's long-term partners are the National Park Service itself and the National Trust for Historic Preservation. Since NCPTT began operations in 1994, collaborative projects by NCPTT and its NPS and National Trust partners have produced substantial results useful to the preservation community. These collaborations continue to expand as discussed in this projects update.

National Park Service

Since 1994, NCPTT has collaborated with NPS archeological centers throughout the United States and NPS' conservation center at Harpers Ferry, West Virginia, on projects that mutually benefit the centers, NCPTT and cultural resources preservation throughout the US. This year, NCPTT has expanded its range of NPS projects to include four projects at national parks and NPS regional offices.

Tabby

In collaboration with NPS' Southeast Regional Office in Atlanta, Georgia, NCPTT is supporting an historic structures preservation guide for buildings constructed of tabby.

Tabby is a lime-and-shell concrete indigenous to coastal areas of the southeastern US. Issues in conserving tabby structures were addressed at a 1998 symposium organized by the Georgia State Historic Preservation Office and supported by NCPTT through the 1997 PTTGrants program. A summary of the symposium was featured in *NCPTT Notes* 25, page 7, and symposium proceedings

are posted at the Georgia SHPO Web site, <www.gashpo.org/dnr/histpres/tabby>. The Southeast Regional office's new tabby project will build on symposium findings and provide a practical guide for managing historic tabby resources in national parks.

Earthworks preservation

Also in association with NPS' Southeast Regional Office, NCPTT is supporting a study of appropriate conservation and maintenance techniques for earthworks at historic military sites.

The historic landscapes initiative of NCPTT's 1999 PTTGrants program sparked NCPTT's interest in the Southeast Regional Office's earthworks preservation project. The integrity of landscape features depends on proper management strategies and maintenance techniques. This project will address these important landscape preservation issues which affect resources in Federal, state and local stewardship.

E-publishing

In collaboration with Chaco Culture National Historical Park in New Mexico, NCPTT is supporting a substantial digitizing and electronic publishing project that will enhance researchers' access to the park archives and preserve historic documents.

Chaco Canyon was declared a national monument in 1907 as one of the most important archeological sites in the US. Decades of research at the park have produced large collections of documents and artifacts. This project focuses on digitizing the park's historic map collection with the two goals of publishing the digitized images online for widespread use and increasing the preservation of the historic maps by decreasing the necessity for using the collection on-site.

Remote sensing field school

In collaboration with Klondike Gold Rush National Historical Park in Alaska, NCPTT is supporting the development of a field school for remote sensing techniques.

Dyea, Alaska, at the head of the historic Chilkoot Trail, was a major transportation hub during the Klondike Gold Rush of 1897-98. In a brief period, Dyea both reached an estimated peak population of 8,000-10,000 and was abandoned. Today, erosion, visitation and the encroaching forest threaten this important archeological site.

Remote sensing has proven to be a cost-effective tool for discovering and interpreting archeological features. The development and testing of remote sensing techniques has received considerable NCPTT support previously, as summarized in *NCPTT Notes* and other preservation publications. The Dyea project widens NCPTT's work in remote sensing to include training. The project will increase knowledge about the Dyea townsite and encourage, through training, the use of current technologies in cultural resources preservation.

In these projects, NPS resources serve as laboratories for advanced work in preservation research, training and information distribution — work that can benefit cultural resources throughout the US.

National Trust for Historic Preservation

NCPTT contributes support to the National Trust's Statewides program, the goal of which is to foster the development of private non-profit organizations that, in collaboration with State Historic Preservation Offices, serve statewide constituencies in each US state. Within NCPTT's commitment to serving preservationists at the Federal, state and local levels, partnerships with the National Trust and statewides assist NCPTT in serving preservation colleagues whom NCPTT might not reach alone.

As part of the statewides project, NCPTT is encouraging statewides to develop their capacity for technical issues

through incubator grants. The statewide grants are modeled on NCPTT's larger PTTGrants program, and are available to statewide organizations through the National Trust.

In 1998, NCPTT and the National Trust awarded four incubator grants --

- *Louisiana Preservation Alliance* and *Preservation Alliance of West Virginia* received support for statewide heritage education projects.
- *Preservation New Jersey* received support for Internet training for nine statewides in the northeastern US.
- *Montana Preservation Alliance* created a Montana Community Preservation Team to conduct workshops and compile a workbook to assist small rural communities identify, evaluate and preserve their historic resources.

In the 1999 round of incubator grants, NCPTT and the National Trust recently funded five projects —

- *Preservation Trust of Vermont* will develop strategies for wireless telecommunications installations in historic structures, which will provide revenue for maintaining historic structures and perhaps decrease the visual impact of "cell" installations on historic scenes.
- *Georgia Trust for Historic Preservation* will bring the success of Preservation New Jersey's 1998 Internet training to statewide colleagues throughout the southeastern US.
- *New Hampshire Preservation Alliance*, *New Mexico Heritage Preservation Alliance* and *Maine Preservation* will enhance public access to preservation information in each of their states via databases and the Internet.

Each project represents work initiated by statewides in response to their audiences' needs. Each project contributes to the knowledge that sustains interest in cultural resources, and to their long-term preservation. Each project represents in-

formation or skills useful to the national network of preservation organizations — and builds technical competence in appropriate increments.

— John Robbins
— Carol Wyant

Ms Wyant is Director of Statewide Partnerships at the National Trust for Historic Preservation.

For further information on NCPTT collaborations with parks and regional offices, including the projects described above, contact NCPTT. For information on the National Trust's statewides initiative, contact Ms Wyant; telephone 202/588-6216, facsimile 202/588-6223, e-mail <carol_wyant@nthp.org>.

Museum Lighting Protocol

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Cuttle recorded each subject's illumination settings and evaluations.

Experiment results showed that subjects had no difficulty adjusting illumination levels — whether provided by the MR spotlight or the three-band light source — to match the lighting effect in the control gallery. The illumination settings selected by all sixteen subjects fell within a narrow range, demonstrating that the three-band light source provided illumination comparable to common museum lighting systems. In addition, subjects gave generally similar evaluations of the artworks displayed in the galleries, indicating that their viewing satisfaction was not compromised by the three-band lighting system.

The three-band light source provided acceptable levels of illumination, substantially reduced irradiance and potential conservation benefits. Three-band lighting could allow museums to display artifacts and artworks vulnerable to light damage for longer periods than possible with

traditional illumination sources. Museums commonly assess light exposure in terms of lux hours per year. An object subjected to lighting of 50 lux and displayed for 3,000 hours a year, for example, is exposed to 150,000 lux hours per year. This measure, however, assumes use of standard MR spotlights. If the illumination source were changed to three-band lighting, the effective exposure might be reduced to 89,000 lux hours per year.

Cuttle proposes two possibilities for developing three-band lighting systems for widespread use. The simplest approach would involve a new type of filter capable of converting the continuous spectrum of a regular MR lamp into a three-band spectrum. The drawback of such a filter, however, is its inefficiency. Increased power costs and heat gain would result from the boost in lamp wattage needed to compensate for illuminance reduced by filtering. An alternate and more efficient approach would involve developing a three-band lamp designed specifically for museum applications. Cuttle is confident that lighting engineers could produce a lamp that would

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Further Reading

Brief comments on some recent additions to NCPTT's library

History in Urban Places — The Historic Districts of the United States

David Hamer

*Softcover book, illustrated,
277 pp. Columbus, Ohio: Ohio
State University Press (1998)*

and the history of a district subsequent to designation. Mr. Hamer then looks beyond current practice towards aspects of history that perhaps are not represented in districts, and the uses and impacts of district designation.

Mr. Hamer concludes with the chapter “Thirty Years On: Do Historic Districts Have a Future?” — a good discussion on confronting and interpreting racial, ethnic, economic, contemporary and other histories. Preserving local history comprehensively requires intelligence and subtlety — qualities that Mr. Hamer endorses for creating and managing historic districts.

Disaster Management Programs for Historic Sites

Edited by Dirk H.R. Spennemann and David W. Look

*Softcover book, illustrated,
195 pp. San Francisco: National
Park Service and the Western
Chapter of the Association for
Preservation Technology; Albury,
Australia: Charles Sturt University-
The Johnstone Centre (1998)*

This book is a compilation of papers presented at a June 1997 conference in San Francisco titled “Management of disas-

ter mitigation and response programs for historic sites.” The conference brought together preservationists and others from throughout the US and Pacific nations.

The book addresses contemporary practice in disaster management, with a look forward to improving resources and response. Particularly interesting are chapters on training in disaster mitigation for cultural resources, and developing an online network of training, information and experience in hazard mitigation for cultural resources.

Disaster Management Programs for Historic Sites is available from David Look at the National Park Service's Pacific Great Basin Support Office; telephone 415/427-1401, facsimile 415/427-1484, e-mail <David_W_Look@nps.gov>.

The History of Forgetting — Los Angeles and the Erasure of Memory

Norman M. Klein

*Softcover book, illustrated,
330 pp. New York: Verso
(1997)*

The Least Remembered City

Paul Forrer

Video, 30 minutes (1998)

These studies of urban change and how a city is — or is not — a record of its past have great depth and will appeal to those interested in questions of why we preserve and the futility of preservation.

Although Mr. Klein's book proposes to be “merely a story

about how one person decides to forget — voluntarily or involuntarily,” experienced preservation practitioners may find that Mr. Klein's thinking resonates with their own.

Los Angeles — “the most photographed and least remembered city in the world” — is the book's gigantic case study, which provides ample material for those concerned with time, what remains of the past and what's missing. Particularly compelling is the chapter “Where is Forgetting Located?,” which discusses the structure of memory in western European culture, memory lapses and reconstructions.

The Least Remembered City is a video interpretation of *The History of Forgetting's* largest theme — erasing the past. The videos's main character is the removal of historic Los Angeles as planned in the 1930s and 1940s and executed in the 1960s and 1970s, with Mr. Klein as narrator. The video is an intriguing visual discussion of what destruction and loss can mean, touching on the too-common predicament that what remains of a place's past persists not because someone cared, but rather because someone forgot to tear it down.

WWWWeb

Some recent additions to Web resources that might interest Notes readers —

<www.cr.nps.gov/nr/twhp>

Teaching with Historic Places is a heritage education program within the National Park Service's National Register of Historic Places. Teaching with Historic Places has published over fifty classroom-ready lesson plans, many of which are based on sites within the National Park System. Lesson plans and other materials are now Web-accessible, with more to come in the near future.

<www.gsa.gov/pbs/hptp>

As public steward of many historic Federal properties, the General Services Administration has developed technical procedures for evaluating, maintaining and repairing historic properties — much of which is now available online.

<www.openstudio.org/Lessons>

Open Studio: The Arts Online is a partnership project of the Benton Foundation and the National Endowment for the Arts with the goal of stimulating digital publishing in the arts through Internet skills training. The lessons apply to digital publishing in preservation as well. Tutorials on Internet use and Web site development will be useful to organizations considering creating or enhancing their online presence.

<memory.loc.gov/ammem/hhhtml/hhhome.html>

The Library of Congress National Digital Library Project's new Web site is dedicated to the Historic American Buildings Survey/Historic American Engineering Record. The site features documentation of architecture, engineering and design throughout the United States and its territories. Beginning with an online catalog of the National Park Service's HABS/HAER catalogs, the site continues to grow with the addition of drawings, photographs and written histories for over 35,000 historic properties documented by HABS/HAER.

Microorganisms and Stone Degradation

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accurate data, Mitchell is currently working with more sophisticated tools — including a laser GC-Mass Spectrometer recently acquired by Harvard University — to analyze this problem. Use of mass spectrometry also will allow Mitchell to study sulfur compounds and hydrocarbons involved in calcium loss.

As research continues, Mitchell has begun to publicize the results of work completed to date. He is scheduled give presentations at the "Microbiology and Art" conference in Italy in June 1999 and at the International Biodeterioration Symposium in Washington, DC in August 1999. Mitchell also is writing a conservation journal article that will describe his laboratory tests, analytical methods and research findings in detail. In uncovering important information about the role played by microorganisms in the stone degradation process, Mitchell's work has broken new ground in the study of the effects of pollutants on stone buildings and monuments and has contributed substantially to the work of NCPTT's Materials Research Program.

This article continues an NCPTT Notes series on pollutant effects on cultural resources — the focus of NCPTT's Materials Research Program. Recent prior articles, "Bronze Corrosion and Outdoor Pollution" and "Studies in Biodeterioration of Cultural Resources," appeared in NCPTT Notes 21 and 22.

Documenting Complex Curved Surfaces

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computer for downloading into advanced surface modeling software. The software handles all data in three dimensions and allows the operator to produce any required two- or three-dimensional view of the object. With total station digital documentation, Mystic Seaport Museum has reduced the time required to measure and draw vessels by over 75 percent.

For more information and a manual on using the total station system, visit Mystic Seaport's Web site <www.mysticseaport.org/public/collections/shipyard/sokkia.total.station.html>. Copies of the final report (PTTPublications No. 1999-06) are available from NCPTT's Publications Manager.

— Mark Starr

Mr. Starr heads the documentation division at Mystic Seaport Museum's H.B. duPont Preservation Shipyard.

June 1999 - March 2000

NCPTT welcomes calendar items sent in care of NCPTT's Publications Manager. Only items with minimum two-month lead will be considered for publication. A more extensive listing of conferences, training and other preservation events is available in the Resources section of NCPTT's Web site <www.ncptt.nps.gov>.

June

- 1 **Preventive Conservation of Collections training sponsored by Fundacion Antorchas, Buenos Aires, Argentina.** For information, contact NCPTT.
 ■ NCPTT is collaborating with the Smithsonian Institution on conservation training sessions that begin May 17 and continue through June 25. NCPTT's topics include conservation science, pest control, metals, stone and architectural materials.
- 7-13 **American Institute for Conservation of Historic and Artistic Works annual meeting in St. Louis, Missouri.** For information, contact AIC; telephone 202/452-9545, facsimile 202/452-9328, e-mail <InfoAIC@aol.com>, Web <palimpsest.stanford.edu/aic/>.
 ■ NCPTT is sponsoring scholarships for students in preservation and conservation graduate programs to attend the AIC annual meeting and conference. The Foundation for the American Institute for Conservation will award the scholarships. For information, contact Sarah Stout at AIC; e-mail <sarahaic@aol.com>.
 ■ NCPTT is sponsoring the new Electronic Media Specialty Group sessions and the Digital Roundtable at the AIC annual meeting and conference. For information, contact AIC.

July

- 19 **Conservation of Our Cultural Heritage summer program** sponsored by the University of Southern California in Los Angeles, California, July 19 through August 3. For information, contact Jody Cherry, USC School of Architecture-Historic Preservation Program; telephone 213/740-2420, e-mail <jcherry@usc.edu>, Web <www.usc.edu/architecture/preservation>.
 ■ NCPTT will conduct architectural materials conservation sessions on July 27 and 29.

September

- 1 **Application deadline for 1999 James Marston Fitch Charitable Foundation Mid-Career Grant Awards** sponsored by the James Marston Fitch Charitable Foundation and the Samuel H. Kress Foundation. For information, contact Margaret Evans, Beyer Blinder Belle; telephone 212/777-7800, facsimile 212/475-7424.
- 1 **Call for presentations deadline for American Association of Museums annual meeting in Baltimore, Maryland, May 14-18, 2000.** For information, contact AAM; Web <www.aam-us.org/guidelines.html>.
- 1 **Call for papers deadline for Society of Architectural Historians annual meeting in Coral Gables, Florida, June 14-18, 2000.** For information, contact SAH; Web <www.sah.org/cfpmi.html>.
- 21-23 **Preservation Options in a Digital World: To Film or Scan workshop** in Omaha, Nebraska, sponsored by the Northeast Document Conservation Center. For information contact NEDCC; telephone 978/470-1010, e-mail Sona Naroian <sona@nedcc.org>, Web <www.nedcc.org>. For other locations and dates, see October 26-29, 1999 and March 30-April 1, 2000.
- 30 **Redesign: The Conservation and Preservation of America's Resources at Mt. Rainier National Park** conference September 30-October 3 in Mt. Rainier National Park, Washington, sponsored by the American Institute for Architects-Historic Resources Committee. For information, contact AIA; telephone 800/242-3837, Web <www.e-architect.com/pia/hrc>.

October

- 3-4 **Preserving the 20th Century Building Envelope** conference in Cambridge, Massachusetts, sponsored by Technology & Conservation and others. For information, contact Technology & Conservation; telephone 617/623-4488, facsimile 617/623-2253.

- 5-9 **The Broad Spectrum: The Art and Science of Conserving Colored Media on Paper** conference in Chicago, Illinois, sponsored by the Art Institute of Chicago and others. For information, contact Harriet Stratis; telephone 312/857-7662, facsimile 312/443-0085, e-mail <hstratis@artic.edu>, Web <www.artic.edu/aic/collections/dept_prints/prints.html>.

- 8-10 **Ground-Penetrating Radar Techniques for Discovering and Mapping Buried Archaeological Sites** workshop in Denver, Colorado, sponsored by the University of Denver and NCPTT. For information, contact University of Denver; telephone 303/871-2684, Web <www.du.edu/anthro/GPRCLASS2.html>.
 ■ This workshop developed from research work supported by NCPTT's 1996 Preservation Technology and Training Grants program. The research project on new data and image processing techniques was summarized in NCPTT Notes 26, page 4.

- 17-23 **XII General Assembly of ICOMOS and World Congress of Conservation of Monumental Heritage** in Mexico City, Guanajuato, Morelia and Guadalajara, Mexico. For information, contact ICOMOS; e-mail <icomosmex99@compuserve.com>, Web <www.icomos.org>.

- 19-24 **National Trust for Historic Preservation's National Preservation Conference** in Washington, DC. For information, contact NTHP; telephone 202/588-6100, facsimile on-demand 202/588-6444, Web <www.nationaltrust.org>.
 ■ NCPTT contributes support to NTHP's Statewides Initiative; the Statewides meeting at the conference is October 19.

- 20-23 **Association for Preservation Technology** annual meeting in Banff, Alberta. For information, contact Larry Pearson, Alberta Community Development, 8820 112th Street, Edmonton, Alberta, T6G 2P8, Canada; telephone 403/431-2307, e-mail <lpearson@mcd.gov.ab.ca>.
 ■ NCPTT will participate in an Information Technology and Heritage Conservation training course October 24-26. For information, contact David Whiting; telephone 403/247-8711, e-mail <dwhiting@icomos.org>.

- 21-23 **Historic Bridges Conference** in Wheeling West Virginia. For information contact the Institute for the History of Technology and Industrial Archaeology, West Virginia University, 1535 Mileground, Morgantown, WV 26505; telephone 304/293-7169, facsimile 304/293-2449, e-mail <Lsybolt@wvu.edu>.

26-29 **Preservation Options in a Digital World: To Film or Scan** workshop in Omaha, Nebraska, sponsored by the Northeast Document Conservation Center. For information contact NEDCC; telephone 978/470-1010, e-mail Sona Naroian <sona@nedcc.org>, Web <www.nedcc.org>. For other locations and dates, see September 21-23, 1999 and March 30-April 1, 2000.

November

1 One of two annual postmark deadlines (the other is March 15) for grants under the **American Association of Museum's Museum Assessment Program**, including MAP I, II and III. For information, contact MAP; telephone 202/289-9118, facsimile 202/289-6578, e-mail <map@aam-us.org>.

7-9 **Restoration & Renovation** trade exhibition and conference in Charleston, South Carolina. For information, contact EGI Exhibitions; telephone 978/664-6455, facsimile 978/664-5822, e-mail <show@egiexhib.com>, Web <www.egiexhib.com>.

December

17 Application postmark deadline for NCPTT's **FY2000 Preservation Technology and Training Grants**. The PTTGrants brochure will be mailed soon to *NCPTT Notes* subscribers, FY2000 PTTGrants information also will be posted soon to NCPTT's Web site.

27-30 **Archaeological Institute of America** annual meeting in Dallas, Texas. For information, contact AIA; telephone 617/353-9361, facsimile 617/353-6550.

March

15 One of two annual postmark deadlines (the other is November 1) for grants under the **American Association of Museum's Museum Assessment Program**, including MAP I, II and III. For information, contact MAP; telephone 202/289-9118, facsimile 202/289-6578, e-mail <map@aam-us.org>.

30 **Preservation Options in a Digital World: To Film or Scan** workshop, March 30-April 1 in Omaha, Nebraska, sponsored by the Northeast Document Conservation Center. For information contact NEDCC; telephone 978/470-1010, e-mail Sona Naroian <sona@nedcc.org>, Web <www.nedcc.org>. For other locations on other dates, see September 21-23, 1999 and October 26-28, 1999.

Ongoing Opportunities

Building Conservation Masterclasses at West Dean College offer materials conservation training in partnership with English Heritage and Weald & Downland Open Air Museum. For information, contact West Dean College, West Dean, Chichester PO18 0QZ, United Kingdom; telephone (+44-0) 1243-811301, facsimile (+44-0) 1243-811343, e-mail <westdean@pavilion.co.uk>, Web <www.westdean.org.uk>.

Campbell Center courses in historic preservation, conservation and care of collections in Mount Carroll, Illinois. For information, contact the Campbell Center; telephone 815/244-1173, Web <www.campbellcenter.org>.

International Academic Projects at University College London-Institute of Archaeology promotes education, training and research in conservation, archeology, anthropology and related preservation fields. IAP offerings include distance learning courses. For information, contact IAP, 6 Fitzroy Square, London W1P 6DX, United Kingdom; telephone (+44-171) 380-0800, facsimile (+44-171) 380-0500, e-mail <IAP@archetype.co.uk>, Web <www.ucl.ac.uk/~tcf313>.

International Center for the Study of the Preservation and Restoration of Cultural Property courses in architectural and fine arts conservation in Rome, Italy, and elsewhere. For information, contact ICCROM, via de San Michele 13, I-00153 Rome RM, Italy; telephone (+39-06) 585-531, facsimile (+39-06) 5855 3349; e-mail <training@iccrom.org>, Web <www.iccrom.org>.

National Preservation Institute seminars in historic preservation and cultural resource management in various venues. For information, contact NPI, POB 1702, Alexandria, VA 22313; telephone 703/765-0100, e-mail <infor@npi.org>, Web <www.npi.org>.

Passport in Time (PIT) Traveler volunteer opportunities at US Forest Service archeological and historic sites. Project list, project descriptions and application forms are available on the Web <www.swanet.org/jobs99>.

University of Nevada Heritage Resource Management courses in historic preservation and anthropology. For information, contact University of Nevada, Reno; telephone 775/784-4046 or 800/233-8928, facsimile 775/784-4801, Web <www.dce.unr.edu/hrm>.

University of Victoria Cultural Resource Management Program courses in museum studies, heritage conservation and cultural management, in Victoria, British Columbia, and via distance learning. For information, contact Joy Davis, University of Victoria Division of Continuing Studies, POB 3030 STN CSC, Victoria, BC V8W 3N6 Canada; telephone 250/721-8462, facsimile 250/721-8774, e-mail <joydavis@uvic.uvic.ca>, Web <www.uvcs.uvic.ca/crmp>.

Volunteers in Parks opportunities at National Park Service sites — including archeological and historic sites — are described on the Web <www.nps.gov/volunteer/jobs>.

Museum Lighting Protocol

Continued from page 7

convert electrical power directly into a three-band spectrum. While a lamp would be superior to filters, lamp development costs are likely to be substantial — although the costs perhaps could be limited by collaboration among lighting manufacturers, conservation scientists and others interested in this improvement.

Despite the success of his research, Cuttle admits that the potential conservation benefits of three-band lighting may have a limited audience. Many art museum specialists, for example, insist that natural light is the only acceptable means of illuminating some types of artworks,

and others may be skeptical since no visible differences exist between three-band and conventional lighting. Cuttle nonetheless believes that most museum lighting specialists will regard three-band lighting as a significant innovation that offers another tool for reducing light-induced degradation of museum collections. Further tests in actual museum environments and critical study by conservation scientists and other museum professionals will reinforce Cuttle's work — which, to date, represents an important step towards improving museum lighting systems.

Copies of the final report for this project (PTTPublications No. 1998-31) are available from NCPTT's Publications Manager.

Our Mission

United States Department of the Interior

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and to honor our trust responsibilities to tribes.

National Park Service

The National Park Service preserves unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education and inspiration of this and future generations. The Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

National Center for Preservation Technology and Training

The National Center for Preservation Technology and Training promotes and enhances the preservation of prehistoric and historic resources in the United States for present and future generations through the advancement and dissemination of preservation technology and training.

NCPTT, created by Congress, is an interdisciplinary effort by the National Park Service to advance the art, craft and science of historic preservation in the fields of archeology, historic architecture, historic landscapes, objects and materials conservation, and interpretation. NCPTT serves public and private practitioners through research, education and information management.

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